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# JOURNAL

OF THE

## ROYAL HORTICULTURAL SOCIETY.

VOL. XXV. 1900.

PARTS I. AND II.

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### FLOWERING AND ORNAMENTAL SHRUBS AND TREES.

By Mr. GEORGE BUNYARD, V.M.H.

[Read January 23, 1900.]

IN taking up this subject it is right I should state that I am not working on fresh lines or unknown subjects, as hardy shrubs have for over forty years been of special interest to me as one branch of my business, and I cannot give a better reason for bringing them before the notice of the R.H.S. than by quoting a cutting from the *Gardeners' Magazine* which appeared after I had decided to attempt to rescue these interesting and beautiful flowering shrubs from comparative oblivion. It runs thus:—  
“There is no more vandalistic treatment of pretty shrubs than that furnished by clipping, and the gardener who employs shears for shrubs should be similarly tortured as a fitting reward. In not a few instances, both in private and public gardens, we see what might, under proper treatment, be handsome shrubs of many varieties, sheared-over every year, thus forming of each one a dumpy round clump, horrible to look upon. It is astonishing that any gardener should allow such wanton treatment to be bestowed on any vegetable life under his control. Constant clipping results in so checking the growth that shrubs (like hedges) become hollow and thin because their root action is correspondingly checked.”

I may at once say that, as a rule, shrubs are seldom given a fair chance, being too often used as stop-gaps, or as nurses for evergreens or conifers: they are mutilated rather than pruned; crushed, and crowded in such a

manner as to prevent their assuming that elegant form which they should develop; used singly instead of in masses; and, in short, neglected in every possible way. Even in nurseries they are not seen in perfection, because for the purposes of sale it is necessary to cut them back severely in order to make all-round plants. Happily at Kew and some other botanical gardens they can be recognised in proper condition, and in such private gardens as Miss Willmot's at Warley Place, Miss Jekyll's at Munstead. I also call to mind their intelligent treatment at Madresfield Court, Great Malvern, where Mr. Crump seems to consider what may be called the feelings and wants of all subjects under his care in that vast and beautiful garden. Still, it is evident that in our provincial parks, cemeteries, &c., they are too often made to assume a set form, and clipped for the sake of tidiness more often than they are allowed to demonstrate their natural beauty and utility.

To the amateur cultivator one advantage they possess is cheapness, as for a £5 note he may buy 100 fine and distinct varieties; or fifty of the choicest for the same sum. Further, they require no special soil or position, except in a few cases which will be noted hereafter; and for elegance, boldness, grace, and contrast with their evergreen brethren they stand out pointedly, as even without flower their foliage alone entitles many of them to a position of importance, ranging as it does from the mossy Tamarisk to Paulownia. Nor must their value as cut flowers be overlooked. They supply sprays of all sizes, suitable for large receptacles as well as for small table vases, and this cutting at the flowering season does the plant good, as will be seen by the notes on pruning. Several are very sweet-scented, and many old favourites have a sentimental value from their frequent notice in poetry and prose, and from their returning to greet us, season after season, linking themselves to our hearts by many a fond association, brightening our work and cheering our leisure hours.

When forming the plan of taking notes throughout the year I was not aware that Mr. Henry Hoare had a work in the press that followed the same lines as my paper, but I can heartily commend his book to all garden lovers, and a perusal of his well-got-up and practical book has enabled me to remedy some deficiencies in my own notes, for which I am deeply obliged. Mr. Hoare also goes into culture and propagation further than I can in a short paper.\*

No one is more aware than myself of the deficiencies in the scope and extent of this paper. I could readily have made it as long again, but I have purposely confined my remarks to such plants as have come under my immediate personal notice, selecting the best, most showy and striking examples, rather than aiming at making a collection of botanical plants, or including such new species and varieties as have yet to pass the ordeal of our severe winters in the south-east of England. Nor have I, although no one is more sensible of their charms and attractions than myself, included those half-hardy species which flourish west of Sussex, on the Hampshire coasts, and find their home and full development in the lovely gardens of Devon and Cornwall. I would throw out a sugges-

\* "Calendar of Flowering Trees and Shrubs," Richard Flint & Co., 48 Fleet Street, E.C.

tion that some writer better acquainted with these south-west country plants should follow with a paper upon them for some future R.H.S. meeting.

As to nomenclature I have followed the usual names which obtain in business, and by which they are most commonly known. English names are given to the popular varieties, and a short, if somewhat curt and incomplete, description is given of the most striking. My paper being compiled rather for the amateur than the professional, many difficult plants to manage are left out purposely. A few suggestions for grouping will be found at the end. It must be borne in mind that although the various subjects are only once mentioned, many remain in flower for several months. For example, the Gorse is seldom without blossom, but to curtail space they are not repeated.

December, January, February.—In the uncertain weather which prevails in the above months it will be best for our purpose to take them together, as in a mild season shrubs which naturally blossom in the latter are often found in flower in the former month. We have *Garrya elliptica*, with its rich green foliage and long pendent catkins; fine as a shrub, and in colder climates worthy of a wall. *Hammamelis arborea*, or Witch Hazel, with its curiously twisted orange flowers, is weird and conspicuous. The *Mezereums*, both red and white, are most effective when massed and, like most of the *Daphnes*, eminent for perfume. The beautiful flowers of the new *Amygdalus* (or *Prunus*) *Davidiana* often open in mild weather. The white one is particularly fine, and its pale green foliage is striking in summer. On walls we get the spicy-scented flowers of the *Calycanthus* or *Chimonanthus fragrans*, from which the scent “Ylang Ylang” is formed. Though a dull orange-brown colour, their perfume is delicious; and when the flowers are plucked and placed in a bowl the warmth of a room brings out the scent. Unfortunately the growth does not allow of sprays being used. Its large Peach-like leaves are a fine contrast to other wall plants in summer. The ever-welcome *Laurustinus*, both the species and the varieties ‘*hirsutus*’ and ‘*lucidus*,’ are grand in the shrubbery, while as a carpet plant few can equal the profuse-flowering *Erica carnea* (or *herbacea*), which brightens our gardens in the dullest of months. The yellow *Jasminum nudiflorum* will often succeed as a shrub. It is also during the wintry weather that one appreciates the rich colour of the stems of the Red Dogwood (*Cornus alba*), which in masses is very conspicuous. The little-known *Larix leptolepis* is also to be commended for its warm colouring when the tender green foliage is shed. *Cornus mascula variegata* exhibits its yellow flowers in February, which, though small in themselves, are very abundant, and light up the shrubbery, while the silvery variegation comes in later in the year.

In March vegetation is very feeble as a rule, and we live, as it were, more on promise than in realisation and fulfilment. Possibly the only flowering trees are the Myrobalan Plums (*Prunus cerasifera*), of which we have the white-flowered, producing both red and yellow fruits, and we welcome its snowy blossoms as a foretaste of spring. The Japanese kinds, as *P. Mume*, double and single red, have not yet shown to advantage. Trees are yet small, and the frosts being most severe next the soil, the precocious blossoms suffer, but in themselves they are very charming.

Occasionally the Almonds will give a few blossoms. The Palm Willow (Plum-leaved) is well worth a position near water or in damp spots: its flowers at this time are most welcome, both cut and on the bushes. The Blackthorn of our hedges flowers with the Myrobalans, but April is the season of Nature's great awakening, and is generally ushered in by the Bitter and Sweet Almond in all their glory of pink and pale blush flowers. In sheltered spots the double Peaches (*Persica*) are conspicuous, but in Kent they are failures. Among the earliest and brightest shrubs are the Forsythias, of which *F. suspensa* or *Fortunei* is best treated as a climber or archway plant, when its bold-toothed deep primrose flowers appear to advantage. It is vigorous, and after flowering the old wood should be cut out and the new growth encouraged. *F. viridissima* is a somewhat ugly bush, but it redeems its character by a profusion of rich yellow flowers, and is an object of interest even at some distance, especially when backed by evergreens. *F. intermedia*, a hybrid between the two previous ones, is more graceful in growth.

The sub-shrub Mahonia (*Berberis*) *aquifolia* unfolds its yellow flowers early in the month, and is a conspicuous object. Perhaps some forms in which finer flowers are developed may soon be selected, and such will be welcome for their striking appearance, although the species, when given room, is most valuable. Nor must we forget the crop of rich violet berries it supplies in August and September. The double Horse (*Ulex europæus*) is too much neglected. Its beauty in a mass has few equals, and its honey-like perfume is most delicious; we must also recollect it can be grown where many other things fail to find nourishment. *Spiræa Thunbergii*, with its multitude of minute white starry flowers, makes a great show, and followed by its pale green narrow foliage is grand for the front borders. *Rhododendron præcox* now claims attention: its soft lilac flowers resting on glossy green foliage render it very conspicuous. There is a variety called 'Early Gem' also, and the allied but taller purple *R. dahuricum* is also very fine: both require peaty soil and some shelter from cold winds. *Prunus* (*Amygdalus*) *sinensis*, or Fortune's Double White Plum, is a neat dwarf grower, and the pink variety *P. s. rubra plena* are both most exquisite varieties, while a little later the *P. triloba* is seen. Its large double rose flowers are lovely, but owing to frosts it is more often seen as a forced conservatory plant. Perhaps of all our April shrubs *Magnolia stellata* (*Halleana*) is the finest, and very suitable for a warm corner where the cold winds cannot so readily mar its elegant bell-shaped flowers. The ever-esteemed *Ribes* is now to the fore, and whether we take the old one (*sanguinea*) or any of the deep red varieties, they are charming. In the whites that called *albidum* is the best; and for pale rose, *R. carnea grandiflora*. *Genista præcox*, a pretty dwarf compact Broom with its creamy flowers, must not be forgotten. It is sometimes grafted on Laburnum stems, after the style of a standard Rose, and is most elegant in that form. Towards the end of April we get a galaxy of blossom. The bright yellow rosettes of *Corchorus japonica* are too seldom seen: there is no better plant to cover a dead wall in a position where few things can grow. The evergreen *Berberis*, such as *Darwinii*, *stenophylla*, and *dulcis*, are glorious. Masses of the former are sheets of orange-yellow, and welcome everywhere, while the graceful *stenophylla*, with its arching stems

strung with thousands of pendent yellow flowers, are quite unique. Those I have named are worthy of a conspicuous position, while they also form beautiful hedges. *B. dulcis* is a very light and airy grower with small foliage and very prickly stems, and its globular yellow and orange flowers are very sweet-scented. *B. dulcis nana* is a pretty pincushion shrub. The snowy *Mespilus* and its varieties (*Amelanchiers*) are very effective either as bushes or as standards: their creamy white flowers are produced freely, and in autumn the golden crimson foliage is much admired. When the tree attains timber size it is a most lovely subject. The Bird Cherry with its white racemes is very effective. Throughout April the tribe of *Malus* (*Pyrus*, Apples) give a charm to the garden, starting the procession with *M. spectabilis* var. 'Kaido,' a new Japanese plant, with semi-double pale-rose flowers. We next get *M. floribunda*, with its profusion of white flowers, shaded on the outsides with red and crimson; then the Siberian Crabs put in an appearance; the yellow, red, and the newer Cheal's Scarlet; while the best of all, perhaps, is *M. spectabilis* fl. pl., with its semi-double globular flowers, produced in bunches, lovely and distinct.

The newer *M. angustifolia* is very distinct: its foliage resembles the Mountain Ash, and it has very large pale blush rose flowers, pleasantly scented. Other good varieties for flower are *M. fl. atrosanguinea*, *M. fl. Packmanni*, or *Halleana*, with ruby foliage, and *Scheideckeri*, the richest coloured variety. Of the Crabs better known for their fruit are Fairy, John Downie, Dartmouth, Transparent, Transcendent, Orange, &c. The allied *Pyrus* (*Cydonia*) *japonica* and its varieties are not less beautiful either as wall plants or shrubs. The best are the species, *P. japonica atrosanguinea*, the mottled *Moerloosi*, and the deep cerise *umbilicata rosea*, while the white *nivalis major* is an exquisite gem. The creamy *candida* is distinct; the dwarf species *Maulei*, with its profusion of salmon and rose blooms, and of this we now have a variety, of a pale primrose colour. In the cool pleasant evenings we can now drink in the overpowering scent of *Daphne pontica*, with its numerous green flowers, which are only scented at night. This is a fine sub-shrub for a shady spot, and does grandly on chalk.

Scarcely less conspicuous than the Apple tribe are the Japanese Cherries. The umbrella-like weeper *Cerasus japonica rosea pendula*, although a little formal on stems, is welcome for its early and profuse flowering; while the glorious *Cerasus Watererii*, with its clusters of pale blush flowers, is grand either as a bush or standard, and a fine subject for forcing. The newer crimson-flowered 'J. H. Veitch' is a great gain. *Amygdalus nana* (sometimes called *Prunus*) is a charming dwarf shrub, coming this month with its lovely blossoms of rich pink. *A. Georgica* is not worth culture. In white flowers the feathery arching *Spiraea multiflora arguta* is most lovely, and as a dwarf plant very commendable. *Rhodora canadensis* is now conspicuous in the peat beds and has a purplish rose shade of colour—rather unusual. The *Cytisus* are in full glory too, but I am not botanical enough to separate *C. biflorus*, *elegans*, and *elongatus*. Any way they are all very pretty low shrubs, crowded with yellow Clover-like flowers. Late in April the double *Ribes sanguinea* is very pretty, and the variety *grandiflora* is also later than the old red variety. The Hawthorns, although generally grown as standard trees, make very

good bushes. The single scarlet, double pink, and Paul's double scarlet are the best, while the common white 'May' is worth a position.

Early in May Magnolias claim attention. We have Lenné with its vase-like flowers, pale within, shaded without by rich purple, glorious and distinct among the deciduous sorts. Conspicua (Yulan) is smothered in its snowy white blossoms, always beautiful. Soulangiana and Norbertia are good and alike, with large flowers more or less shaded, and popularly known as Tulip Magnolias. All these are fine as shrubs and worthy of the protection of a wall where their handsome large foliage is useful for contrast. *M. purpurea* is much dwarfer, and has smaller flowers later in the season. Leaving blossoms for a moment, the most conspicuous tree at this time is Acer (Sycamore) Prince Hendjery. The foliage is a remarkable combination of greens, browns, and orange, and altogether most attractive as a shrub or small tree. *Spiræa opulifolia aurea* is remarkable now for its "old gold" foliage, and *S. Fortunei macrophylla* for the rich claret of its young foliage. *Cornus Spathi* is at its best with its virgin foliage, yellow, orange, and red, and is now one of the most conspicuous things. *Berberis vulgaris purpurea* is also very rich with its claret blue foliage, a singular combination of colour; in masses most desirable. The golden Laburnum is, perhaps, best in its young state, and forms a striking contrast to its surroundings. *Piptanthus Nepalensis*, with its curious foliage, has now masses of yellow flowers. *Staphylea colehica* is come with its creamy-white clusters of blossom; having now some foliage it is prettier than when forced. The delicate strands of the white Portugal Broom (*Genista alba*) are in full glory, and, backed by the purple *Berberis*, are exquisite. *Ribes aureum*, with very sweet-scented yellow flowers, appears, and the so-called Tartarian Honeysuckles (*Chamæcerasus*), its twin flowers, are only conspicuous from their numbers, but the white variety, *Morrowi*, cannot be recommended. *Acer Woorleyi* is now in full glory, while its primrose foliage makes it worthy of larger culture as a Sycamore-like park tree. The golden-leaved Mountain Ash is also pretty, and the golden Privet very distinct in its first spring shoots (*Ligustrum ovalifolium aureum*). The purple-leaved Filbert is a very fine dark foliage plant. *Corylopsis spicata* and *C. paucifolia* are interesting shrubs, producing long golden catkins. As a front row shrub the silver variegated *Corchorus* is pretty. Toward the end of May we have a galaxy of Lilacs, and, to say the least, a garden could scarcely be called such without Lilacs. The newer introductions are greatly in advance of the older varieties, and in the singles, *alba magna* (*virginalis*), is certainly the largest and most beautiful; the panicles are large and spreading, and the flowers stout and enduring. *Souvenir de Louis Späth* is the finest dark variety: the panicles are long and elegant. Next is *Croix de Brahy* which has more violet in its colouring; then comes the older and cheaper *Charles X.*; *Corinne* has a reddish tint, very distinct, with large trusses. For grace and beauty scarlet Persian or Siberian is the best of its class. The white Persian is pretty but washy in colour. It is, however, when we come to the double Lilacs that the greatest advance is noted. The panicles are massive and the flowers very lasting. The double white *Marie Lemoine* is by far the best. In the double purples, so far, *Pyramidalis*, which has very long upright panicles.

strikes us as the grandest ; next come Souv. de Louis van Houtte, with wider petals ; Léon Simon has a flattish corymb, very double and distinct ; Mme. Kreutzer, rich dark colour ; Lemoinei fl. pl. is also good ; President Grévy very pale. The graceful Bramble, *Rubus deliciosus*, with single Rose-like flowers, is a gem. In this month we also get the glorious Laburnums, with their lovely drooping festoons. For perfume and length none beat Watereri : the growth is rapid and the blossoms are very freely produced. The Scotch is rather stubby in growth, while the species Parkesii and Alsingeri produce very long but thin panicles. The Snowdrop tree, *Halesia*, is well worth growing, and the Japanese *Xanthoceras sorbifolia* is a grand addition—better perhaps as a bush, as one can then look into the flowers and see their beauty, pale blush with golden centres. One seldom sees *Ulex germanica*. It is a prostrate form, producing very small golden flowers in the greatest abundance. The Spanish Gorse (*Ulex hispanica*), forming a round bush, is now in full glory, and is one of the best rockery or bank plants we have. The Irish Gorse or Furze forms a tuft of upright branches freely spangled with yellow flowers. The curious white fan flowers of *Rhodotypos kerrioides* now appear : it forms a pretty bush. The old Guelder Rose (snowball) is ever welcome, and plants that have encouragement at the root are most showy. The lovely evergreen *Choisia ternata*, with its glossy trifid leaves and white Hawthorn-scented flowers, comes to close the month of May.

From early June and onward we get a fresh blaze of beauty, and *Weigelias* begin to flower, their elegant Fuchsia-like blooms, profusely borne on graceful arching stems of the amabilis type, give a new interest to our shrubberies. Taking the rosea types first, which form compact bushes, the species is very fine, its flowers open blush, and shade off to pink in a charming way. The white variety, *candida*, is well named, and the rich port-wine colour of *Eva Rathke* shows a great divergence. The largest flowers (almost *Gloxinia*-like) are those of *Abel Carrière*, a glorious rich rosy variety. *Isoline* is also very fine, opening pale and shading to a rich rose ; but the amabilis types, which have a much more free growth, are the finest : their wreaths of flower-crowned arching shoots are most lovely. The type is clear pale rose, and the variety *alba* has flowers like *rosea*. The Japan species, with pale green leaves, *W. hortensis nivea*, is a pretty white-flowered dwarf shrub. The *Philadelphus* (formerly called *Syringas*) now give grace to our gardens, and the long growths of *P. grandiflorus* (or *speciosus*), with their large opalescent white blossoms, are superb. *Lutzmanni* and *Zeherii* have similar flowers, but lengthen out the season as they flower later ; Mons. Lemoine's hybrids and novelties (represented by *Lemoinei*, *Boule d'Argent erectus*, *Gerbe de Neige*, *Candelabra*, a compact double form of upright growth), and later the scented *microphyllus* noted as a compact shrub, are all worth culture. The old double and single *Syringas* (*P. coronarius*) may now be dispensed with. It is curious that their foliage smells so like Cucumber. The dwarf *Deutzia gracilis* with its pretty white flowers is fine in sheltered positions, but very apt to get cut by early frosts. *D. parvifolia* is a pretty hybrid of Lemoine's, and is of stouter build in flower and leafage. The shrubby Moutan Tree *Pæonies* are

now in full beauty : they like a sheltered spot and deep richly manured soil.

The Broom family then claim attention : foremost among them is *Cytisus Andreanus*. There is no plant of recent introduction which has so taken the fancy of the public : its chocolate and gold flowers are so distinct. Our wild species *C. scoparius* is one of the very best shrubs ; while its cream-coloured variety is very choice. *C. albus* makes a low bush, and is, like the *C. purpureus*, often grafted on *Laburnum* stems when they show to advantage.

The Genistas are also all aglow with their pretty *Cytisus*-like flowers. *G. sagittalis*, a very interesting dwarf species with leaves like Hart's Tongue Fern, forms a carpet plant. *G. Skipkaensis* is a pretty prostrate form with pale fluffy flowers, while *G. tinctoria pleno* has rich double flowers and creeps on the ground. *Coronilla Emerus*, with its pretty glaucous trefoil foliage and long yellow panicles, is also worth growing. *Syringa japonica*, a novelty with large spreading panicles of French white flowers, after the style of a Privet, is interesting. The creamy foliage of *S. coronaria variegata* is now striking, and useful for partially shaded places, but burns in the open. The Bramble, *Rubus nutkanus*, with its large Raspberry-like foliage and white flowers, is a grand sub-shrub. *Cornus mas variegata* is now coming to the front, and is one of our very best silver-leaved shrubs. The varieties *Cornus siberica elegantissima* and *C. argentea marginata* are also useful for leaf pictures. Among foliage shrubs and trees the Japan Maples in their spring beauty take a first place : the blood-red colour some assume is retained all the season, as in *A. polymorphum purpureum*, *atropurpureum*, *dissectum atropurpureum*, &c. ; further their lovely change of colour in autumn justly entitles them to attention, and we can also say the same of *Prunus Pissardi* : its deep claret foliage often exceeds the colour of copper beech, and it is a good town subject. For a dwarf bed or front row the Japan *Ribes pumilum aureum* is neat. No silver variegated plant equals *Acer negundo variegata*, which is the most elegant and constant of all our silver trees. The well-known seaside *Escallonias*, grand in foliage and flower, give a new interest. At this time we have *E. macrantha*, crimson, *E. exoniensis*, a very free white-flowered form : they make fine bushes or wall plants ; the dwarf *E. Phillipiana*, with its profusion of white starry flowers, is a gem. *Exochorda Albertii* (Pearl bush) is a pretty shrub with white flowers at the ends of the shoots. The evergreen *Cistus* tribe gives us *C. laurifolius*, a handsome evergreen with fine white Poppy-like flowers ; *C. ladaniferus*, with chocolate blotch at the base of each petal ; *roseus* or *crispus*, and a dwarf white species, which has the nursery names of *Clusii*, *formosus*, *undulatus*, &c. The tall growing *Deutzias*, another legacy from Japan, are now in evidence ; *scabra*, the better known single white variety ; the double *crenata flore pleno*, with purple shading on the back of its rosettes. The fine white *Pride of Rochester* or *Watereri*, with its profuse panicles of pure white rosettes, is a fine subject for forcing also. *Discolor purpurascens* has so far not been good. *Cytisus secundus*, a neat yellow-flowered sub-shrub, and *C. trifolium* are both useful ; *Rubus odoratus*, the showy pink flowering Raspberry, is also noticeable : its soft leaves are useful for fruit packing.

Of the large family of Rhododendrons which the Waterers and Pauls have brought to such perfection and the sweet Honeysuckle-flowered American Azaleas, the golden Pontic, and the buff-coloured Mollis, the newer hybrid Mollis-sinensis, also the double varieties, all splendid and even gorgeous in their way, it will suffice if we name a few of the best for those who can give them peat or sandy loam. Nor must we omit the exquisite *Kalmia latifolia* or the pretty tribe of Heaths now coming into flower. The pink *Daphne Cneorum* is a good edging plant for peat beds, and produces a profusion of neat flowers; as also the *Polygalas*.

Selection of a few of the best hybrid Rhododendrons for effect flowering in May and June:—

*White, and White with spots.*

Delicatum  
Mrs. Agnew  
Minnie  
Snowflake  
Evelyn  
Princess Alice  
Mrs. Russell Sturgis  
The Bride  
Purity  
Sappho  
The Queen

*Rose and Pink of Various Shades.*

Alex. Aide  
Broughtonii  
Catawbiense roseum  
Lady Cathcart  
M<sup>d</sup>me. Wagner  
Mrs. Holford  
Mrs. J. Waterer  
Prince de Rohan  
Stella  
Titian  
Roseum elegans

*Red and Crimson.*

Barclayanum  
Brayanum  
Blundyanum  
Fleur de Marie  
Dr. Hogg  
Warrior  
James Mason  
Fred. Waterer  
Grand Arab (early)  
John Waterer  
Michael Waterer  
Mrs. Shuttleworth

*Purple and Lilac.*

Everestianum  
Fastuosum plenum  
Joseph Whitworth  
Maculatum superbum  
Ne Plus Ultra  
Old Port  
Othello  
Purpureum elegans  
Standard of Flanders  
And many others.

Azaleas are seldom quoted in named varieties. The Nurseries have always good collections of all the species named, and the Mollis section are so much mixed in the seedlings offered that named ones are scarcely better, and naturally more expensive. The newer Mollis-sinensis contain many fine named varieties.

Besides *Kalmia latifolia*, *K. glauca* is a neat dwarf species with red flowers. For edgings also the yellow *Polygala Chamæbuxus* and *P. C. purpurea* form neat tufts, while the various *Ledums*, with *Andromeda polifolia*, which produces its white flowers early in spring, is very distinct. *A. japonica*, with its clusters of white bells, forms a neat shrub; and *A. pulverulenta* (*Zenobia*), with its sprays of crystalline white flowers, is lovely. *Clethra arborea* is very free flowering, with white upright panicles nicely scented.

*In Heaths.*—The dwarf Irish Heaths *Menzesia* (*Daboecia*) *polifolia rubra* and *alba*, with their pretty globular flowers, blossom all the summer and autumn. *Erica vagans*, the Cornish Heath, and its white variety form good bushes. *E. mediterranea*, a tall Lilac form, makes a big bush in suitable positions, and there is a white variety, but they are rather tender; the double Ling, *E. vulgaris* fl. pl. is interesting. Other named varieties, as *Alporti*, *Searlei*, *alba*, *argentea*, are very telling; for making pincushion beds *E. minima* is useful.

The dwarf shrubby Alpen-Roses, *Rhododendron hirsutum* and *R. ferrugineum* and its white variety are very interesting. There are many other peat and bog plants which can be introduced where space permits. *Rhododendron ciliatum* is a pretty species flowering in May. We might here mention a few shrubs notable for their sweet-scented foliage or flowers, such as Lavender, of which we now have a dwarf purple and a white variety. The Rosemary with its aromatic scent, the Southernwood with its refreshing vinegary scent, the Myrtle, the Daphnes alluded to before, *Choisia ternata*, and for damp and peaty spots the Fern-leaved Gale, the Wild Gale, Candleberry Myrtle, *Calycanthus florida* or Allspice, the Sweet Briars, all of which should be grown where there is space.

*Carpenteria californica*, which may be called a giant *Syringa*, is a magnificent plant: its large white cupped flowers are distinctly beautiful. It is an evergreen, and in many places wants a wall. The lovely white St. John's Wort-like *Eucryphia pinnatifida* has not been a success in my part of Kent: it does not like limestone.

Towards June 20 several trees are conspicuous; they can also be grown as cut in shrubs if desired: among these the scarlet Horse Chestnut and the brighter coloured variety *Æ. Briotii* and *rubra nana* are striking. The Judas Tree, *Cercis Siliquastrum*, with its cordate leaves and clusters of pink flowers clasping the branches; the various Elms, with coloured foliage, make an effective display. The Golden Van Houttei or *scabra lutescens* makes a fine tree, and *Ulmus Wreedi aurea* is a bright golden-foliaged variety of neat growth. As a shrub the purple-leaved Elm is good for contrast, the least wind throwing up the leaves and exposing the purple shading on the under sides. In silvery foliage *Pyrus Aria lutescens*, or *Nepalensis*, is very beautiful, for although one fails to detect any yellow in the leaves, the silvery foliage is most conspicuous. The Japan Guelder Roses now make a show; *Viburnum plicatum* is a grand shrub and produces its creamy-white "snowballs" at every joint, and as they shade to pink the effect is extremely beautiful, it is also a grand wall plant. *V. macrocephalum* is not quite so free and more tender, and produces white Hydrangea-like heads. The Scotch Roses, in various colours from white to deep rose and yellow, now unfold their pretty sweet-scented flowers and make admirable dwarf shrubs. The purple Pea-flowered *Hedysarum multijugum* is a very graceful plant, and produces flowers all the summer. *Cistus crispus*, sometimes called *roseus*, and the white *Cistus Clusii* with their numerous blossoms and sage-like foliage continue interesting.

At the extreme end of June, *Buddlea globosa* comes in: its deep orange balls are quite distinct from any other flower. *Philadelphus Lutzmanni* before noted closes the blooming of this lovely tribe. *Styrax*

japonica with its Snowdrop-like flowers is very good. So far *S. Obassia* has not succeeded with me. The yellow *Potentilla fruticosa* or Strawberry bush is a distinct sub-shrub.

The lovely *Robinia hispida*, or Rose Acacia, now unfolds its lovely rose-pink Pea-like blossoms: it is perhaps best as a shrub as less likely to be broken, for the wood is extremely brittle. Nothing can touch this grand Acacia when in full flower. The Roses also are now all in full beauty, and though one could write a paper on them alone we cannot let mention of their names pass us at this season. The Japan Roses *Rugosa* and *R. alba*, with their glossy foliage succeeded by noble hews, are among the best of our shrubs, and who can neglect the Sweetbriars and Lord Penzance's new hybrid Briars, grand as pillars and also beautiful in hew? Janet's Pride Briar is very distinct, and makes a fine 6 ft. bush; Bourbon Mrs. Paul, the single White *Macrantha*, Hebe's Lip, and *Brunonis* are lovely; while large bushes of Allan Richardson, Crimson Rambler, Gustave Regis (apricot), Adeline V. Morel (coppery), Stella Gray (copper and primrose), also the whole family of Dijons, not forgetting Kaiserin Friedrich. The old "alba" Mme. D'Arblay is also a mass of white at this time, and the exquisite Austrian Briars, copper and yellow, Persian yellow, and *Harrisonii* are quite unique and deservedly popular. The American Dawson Rose is also a good bush or pillar, with its numerous little pink blossoms. For dwarf subjects the Polyantha Roses Anna de Montravel, Marie Pavée, Paquerette, Fairy Pet, in white, and the exquisite Gloire de Polyantha in pink are very useful, while the little Golden Etoile d'Or and Perle d'Or are superb. In short, any of the old garden Roses, York and Lancaster, Moss, Cabbage, Provence, Alba, &c., are at this time in perfection.

*Caragana Woolgarica* is generally worked on stems, and is very distinct, with its yellow Pea flowers in clusters 4 or 5 inches long. The white *C. ferox* can only be called a curiosity. *Spiræa Foxii*, with its Elder-like clusters of flowers, is a useful and dwarf plant. The Golden Elder, with its tender young foliage, is now attractive, and the variety *Sambucus nigra plumosa aurea* is a great acquisition. The older silver-edged too is good for shady places. *Phlomis frutescens*, Jerusalem Sage, with its velvety leaves and large heads of yellow flowers, is fine; in fact, June is the month for these hardy shrubs, and it is a pity that the London season so often prevents them receiving the admiration they deserve, as so many people are "in town" when they are in their beauty.

The new *Acer californicum aureum* is a most promising golden-foliaged tree. The golden *Acer negundo* is rather disappointing.

July is ushered in by a grand review of the *Spiræa* family, the earliest to flower being *Fortunei sanguinea*, a very rich form of *callosa* with large umbels. *S. salicifolia* and its varieties; and to the ever-blooming *Bumalda*, *atropurpurea*, and Anthony Waterer, with its rich crimson flowers, add *callosa alba*, and we have four splendid dwarf forms for bedding, as they keep in good order, if the fading flowers are removed, till November. *S. ariæfolia* is grand with its creamy-white tassels of flowers. *Hypericum uralum* is distinct, about 8 feet high, with conspicuous yellow flowers. *H. Androsæmum* is a sub-shrub with rich berry-like seeds. *Spiræa crenata*, with its rich flesh-coloured umbels, is good, dwarf, and distinct.

*S. Pallasii* has fine dark crimson flowers in flat umbels. The sweet Dutch Honeysuckle now blossoms and forms a good bush. The *Ceanothus* tribe have been so generally treated as wall climbers that few are aware how fine they are as shrubs, though not always hardy. If the stools are covered with ashes (like *Fuchsias*) they are grand, as witness the beds at Kew. *Gloire de Versailles* is as yet the best: its soft sky-blue flowers are freely produced. *Ceres*, a blush rose form, is good; while *Asteroides* is a deep gentian blue; *Virginalis*, a white form, is also good. The species *divaricatus*, *Veitchii*, *dentatus*, and *rigidus* are best on walls. Among July plants *Olearia stellulata* (Gunnii) is very charming: its white flowers completely hide the foliage, and it continues in blossom a long time.

In August we get the first show of autumnal beauty, and this list is worth the notice of those who have to cater for shooting parties, as cut flowers are in great demand, and such subjects as *Spiraea Fontenaysii* (white), *Reevesii* (pale rose), *Nobleana*, with its grand branching panicles; *Billardi*, the brightest of the spiky sorts; and *Douglasii*, the richest, are most useful. *Cytisus elegans*, a coronilla-like plant, is handsome.

In shrubby St. John's Worts the compact *Hypericum aureum*, the rather rare *H. chinense*, most elegant of the dwarf species; *oblongifolium* and *patulum*; the neat *H. prolificum*, *Kalmianum*, *Nepalense*, are all fine golden flowering sub-shrubs, and continue in blossom for months. The St. John's Wort *H. calycinum* and its more beautiful relative *H. Moserianum* are among the best creeping plants, their lovely flowers being very conspicuous: they group well with the *Vincas* or *Periwinkles*. The Cobweb tree is a lovely shrub (*Rhus cotinus*) for massing or single specimens; the variety *atropurpurea* is of a darker hue, and the foliage of both is grand, as it changes in the autumn. *Buddlea variabilis* and *B. Lindleyi* are very distinct from *globosa*, and have panicles of lavender and purple flowers. *Genista Ætensis* now comes with yellow flowers, and the rush-leaved Broom (*Spartium junceum*) is one of the finest shrubs we have. The *Hydrangeas* now show up; *H. hortensis*, the white *Dr. Hogg*, and the species *Paniculata grandiflora* are indispensable. *Diplopappus chrysophyllus*, with its numerous white flowers and golden foliage, is a fine sea-side plant. Many of the June and July plants continue in flower, as *Colutea melanocalyx* and *C. arborescens*, interesting for their seed pods. The Orchid-like *Pavia macrostachya* is a lovely large shrub, and is best kept down by cutting, or one loses sight of its beautiful flowers. It is known as the Buck-eye, and is allied to the Horse Chestnuts.

Throughout September we do not get many fresh subjects to remark upon, the blossoms being mostly a repetition of August flowers, except the following:—The tree Hollyhocks (*Hibiscus syriacus*), better known as *Althæa frutex*, can now be had in so many colours that every garden should contain a set. There is the double purple, double red, double white with crimson eye; but the finest are the single ones: *totus albus*, fine silvery white; and *rubra grandiflora*, purple and white with a dark blotch at the base.

*Veronica Traversii*, with its pale lilac flowers, forms a conspicuous bush; and the blue and magenta shrubby kinds, though not hardy inland, are fine sea-side plants. In August and September the *Yuccas* make a

brave show: the dwarf *Yucca flaccida* is most free in flowering; *Yucca filamentosa* is also a good dwarf. The noble *Y. gloriosa* flowers late, and although much affected by planters is not equal in graceful outline to *Y. recurva* and its narrow form *Y. recurva angustifolia*. These large forms blossom as soon as each stem gets strength.

*Spiræa Lindleyana*, the Pampas Grass-like variety, is very elegant this month, and in suitable soil attains 6 to 8 feet in height: it is rather tender in many places. The pretty Privet *Ligustrum Quihoui* is covered with its branching white panicles, and where it succeeds is sweetly scented. *Clerodendron trichotomum* is in flower; *Olearia Hastii* is one of our best evergreens, blooms early in September, and forms a compact shrub with Box-like foliage. *Indigofera australis*, with purplish-red flowers, is a good dwarf shrub, and produces small trusses of flowers in the axils; foliage pinnate. *Indigofera Gerardiana* and *alba* are allied and blossom for a long period. *Caryopteris Mastacanthus*, or Autumn Lavender, is a grand new plant: it flowers freely and attracts much attention, and is the admiration of all visitors. The pinnate foliage of *Rhus glabra laciniata* is grand when it assumes its scarlet autumnal tints; and if plucked and pressed the leaves are fit for winter vases, as they retain their colour.

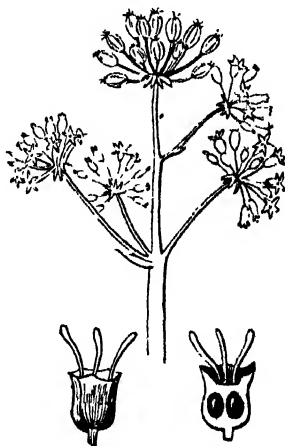
Berried plants commence to show up in September and October: the most conspicuous are the scarlet-berried *C. Pyracantha Lelandii*, a good shrub or wall plant; the Irish hybrids of *Pernettya mucronata*, in all colours from white to crimson; the yellow and red Mountain Ash, the Thorns, *Carrieri*, *Korolkowi*, *coccinea*; *Berberis vulgaris*; the striking British plant *Euonymus europæus* makes a pretty bush or standard: its red carpels are most distinct. A variety called *latifolius* is one of the most beautiful berried plants we have ever seen. The rich violet *Berberis* or *Mahonia* berries, the *Cotoneasters*, Wild Guelder Rose (*V. opulus*), and others, warn us of the approach of winter, and we can scarcely close this paper without alluding to the coloured foliage of autumn. *Acer Colchicum*, *A. Ginnala*, the Japan Maples, Sumachs, *Liquidamber*, *Berberis Thunbergii*, with its flame-colour leaves, the dying foliage of the *Azaleas*, the *Golden Pteleas*, Norway and Sugar Maples, *Salisburia*, *Mespilus*, Birch, Judas Tree, Scarlet Oaks, *Quercus palustris*, *Gymnocladus* and Tulip trees have a beauty of their own and deserve attention at planters' hands. The foliage of the double *Spiræa prunifolia* is very handsome when fading off. This closes our year, November being practically a dead month.

We have alluded to pruning. As a general rule all the stronger growing kinds of flowering shrubs should have those sprays that have borne blossom removed *immediately they are out of bloom*; and such as the *Spiræas*, that blossom on their young wood, can be thinned in summer and cut back in winter if required. The best spikes are produced from the stronger growths. The faded blossoms of *Lilacs* should be at once removed if the plants are required to extend themselves; and the seed pods of *Rhododendrons* check growth if left on after flowering. The summer *Roses* want pruning after flowering (not in winter), but the shoots can be tipped back in February. The knife only should be used, and judgment exercised to keep the best flowering wood in such trees as

**Laburnums.** Acacias need no pruning except to regulate growth. The smaller shoots can be removed to strengthen the flowering branches of nearly all shrubs, and free growths—which show their natural habits, should be encouraged. The planting time commences in October and may be continued until April.

In grouping flowering shrubs very fine effects are obtained by carpeting with prostrate shrubs as Vincas, St. John's Wort, Gaultherias Savin (*J. S. tamariscifolia*), *Erica herbacea* (carnea), and then planting masses of a kind above them; or in other cases central plants rising out of the beds, for example, for winter effect; with Mezerons over *Erica carnea*, Witch Hazel over *Berberis dulcis nana*, Forsythias over *Berberis Aquifolium* for summer, *Acer negundo variegata* with *Prunus Pissardi* or Purple Nut, silver variegated *Cornus mas* over *Gaultheria*; Golden Elder and *Prunus Pissardi*; *Malus floribunda* over *Vinca major*; *Viburnum plicatum* set near *Spiræa bumalda*; Forsythias and Ribes, *Cytisus Andreanus*, *G. præcox*, *C. albus*, and the wild Spanish Broom used with *Prunus Pissardi*; *Acer polymorphum* vars. over *Hydrangea paniculata* is a lovely combination, while large beds can have groups of various families as Guelder Roses, Lilacs, Syringas, tall *Spiræas* arranged in order to give effect the whole summer. Green foliage effects can be made by grouping large leaved Catalpas and Paulownias with *Acacia angustifolia*, and so on. *Berberis stenophylla* and *Darwinii* with *Acer negundo variegata* backed by Portugal Laurels will be a fine group.

These are but a few outlines of the pictures that can be produced, while by introducing Bamboos and *Miscanthus* (*Eulalias*) the effects can be still more heightened, and for winter by a judicious introduction of evergreen silvery and golden shrubs with variegated conifers a constant interest can be maintained. Full use should also be made of the silver and golden leaved shrubs mentioned, to lighten up dark masses in the shrubbery. The flowering subjects named can also be planted separately in prepared stations or set in masses of three, five, or more plants together. Brought forward before masses of evergreens they show up to great advantage, and for breaking straight lines in drives, and even in villa gardens, they are very important.



## OBSERVATIONS ON SOME OF THE PLANTS EXHIBITED.

By the Rev. Prof. GEO. HENSLOW, M.A., V.M.H.

[February 27, 1900.]

CLEMATIS INDIVISA.—A Japanese species exhibited by Mr. Paul afforded a good illustration of a method of climbing by means of the petioles of the leaves; in that these organs are highly sensitive to touch, curling round any object in contact with them, and remaining permanently adhering to the support, though they would have been deciduous if they had not caught hold of anything.

SAXIFRAGA, SPECIES.—Some "Moss-like" forms illustrated a type of growth characteristic of many arctic, antarctic, and alpine plants, it being a result of the climatal conditions surrounding them. *S. longifolia* is remarkable for producing an incrustation of lime along the margins of the leaves, due to the evaporation of water containing it, which has been secreted from water-pores.

ERANTHIS CILICICA.—A species of Winter Aconite from Cilicia, differing from the common form by a more lacinated involucre.

GAULTHERIA PROCUMBENS.—The "Mountain Tea," also the "Box" or "Partridge Berry," of Canada, &c., a member of the Heath family, is one of many plants of which a "tea" is made. Although of widely different families, as Tea, Coffee, Cocoa, Paraguay Tea, &c., they mostly contain the same principle or alkaloid, which renders them so serviceable to man.

AGAPETES (THIBAUDIA) BUXIFOLIA, a member of the Heath family, was exhibited by Mr. Cutbush. It is a native of Peru and Colombia, with long tubular scaly flowers.

PRIMULA HYBRID.—*P. Kewensis* was a new hybrid between *P. floribunda* ♂ and *P. verticellata* ♀. It was a much larger plant than, but much nearer in character to, the male parent, not having the pubescent foliage of the female. Figure of this plant will be found on page lxvi.

VANILLA PLANIFOLIA.—A fine specimen with numerous pods was received from the gardens of Sion House, and afforded material for describing the glandular hairs within the pod, which, as well as the pod itself, furnish the vanilla of commerce.

PAPAW FRUIT.—This was received from Leopold Rothschild, Esq., of Gunnersbury. It was raised from seed, the tree being 10 feet in height and only two years old. The juice of the fruit and leaves is remarkable for having digestive properties, so that tough meat wrapped up in the foliage will become tender, and digestive pills have been made from the dried residue of the juice.

IRIS STENOPHYLLA.—A new species from Asia Minor, exhibited by Mr. Wallace, of Colchester. It is of a deep purple colour, with minute reflexed petals, the sepals (falls) having curious clasps embracing the

petaloid styles, thus making "false tubes" in adaptation for insect fertilisation.

YAM (*Dioscorea batatas*), exhibited by Miss Breton, Forrest End, Sandhurst, who has successfully cultivated this well-known plant.—The tropical species do not thrive in this country; but the more hardy Chinese Yam exhibited is likely to produce good crops in England. It is nearly 2 feet in length, and grows vertically; but if a "race" could be secured which would develop the long rhizomes horizontally, so as to avoid the labour of deep trenching, it might become a new and valuable commercial commodity. The name "Yam" is doubtless a corruption of the French *igname*.



FIG. 1.—CYPRIPEDIUM 'MRS. FRED HARDY.' (*Journal of Horticulture*.)

## THE EVOLUTION OF PLANTS.

Illustrated by the cultivated Nature of Gardens.

By Mr. R. IRWIN LYNCH, Cambridge Botanic Gardens.

[Read March 13, 1900.]

I.—EVOLUTION IN NATURE.

II.—EVOLUTION IN THE GARDEN.

III.—ILLUSTRATIONS, A, OF HYBRID ORIGIN; B, NOT OF HYBRID ORIGIN.

## I.

My point of view and the treatment of my subject may be better understood, perhaps, if I mention that in dealing with this subject I propose to demonstrate, so far as may be possible, the real identity of all evolution, whether it takes place in wild nature or in the cultivated nature of gardens. A very low view is often taken of plants that originate in the garden, and I shall be disappointed if I do not succeed in raising, to some extent, the status of garden hybrids, species and varieties, as entities that are worthy of the same recognition that is accorded to the species, the varieties, and often the hybrids found wild in nature. Evolution in nature is fully recognised by every intelligent mind of this last year of the nineteenth century, but those very same minds have often but little respect for the undoubted evolution that goes on before our eyes in the garden. Bailey writes, not long ago: "This notion that a species to be a species must have originated in Nature's garden and not in man's has been left over to us from the last generation; it is the inheritance of an acquired character." I quite agree with his sentiment, if not quite with the last part of his sentence, which was intended merely, no doubt, to add emphasis.

I propose to deal only with the main factors of evolution, because, certainly, it would be impossible to do more, satisfactorily, in so vast a subject, and for my purpose, also, the main factors are quite sufficient. I have to show, as well as I can, the means or mechanism by which evolution comes about, and I have to show a parallel, or strict similarity, between the operations of Dame Nature uncontrolled and the operations of Dame Nature more or less controlled in the garden. I hold of course the Darwinian theory as the true theory, which, in its main elements, must contain all that is most essential and for ever true. Huxley in his "Life of Darwin" wrote: "I venture to affirm that, so far as my knowledge goes, all the ingenuity and all the learning of hostile critics have not enabled them to advance a single fact of which it could be said, This is irreconcilable with the Darwinian theory." That theory, to my mind, is essentially dependent upon three principal factors.

We have first of all variation, without which there could be no evolution; secondly, we have the struggle for existence, without which there

would be no evolution; and thirdly, we have the survival of the fittest, which must result from the struggle. The grand and universal struggle for existence compels the operation of Darwin's great principle, Natural Selection. This term most completely expresses the process of evolution, a process which must result in the survival of the fittest, or, if preferred, the survival of the fittest to survive.

It may be noticed that I do not take heredity as one of my principal factors. It need not, I think, be associated with any abstract theory of evolution. We might even go so far as to say that the inheritance of character is possibly itself an acquired character. At the same time heredity must be so supremely important that it is impossible to speak of evolution without reference to it. Heredity is undoubtedly the same both in the garden and in nature, so that my argument cannot therefore be affected by it. Suffice it to say that everything—as pointed out by Carrière and others—tends to become hereditary. But I am compelled, because of its interest and because new light is just now rising above the horizon, to venture some remarks, which are perhaps new, upon the theory. By Mr. Walter Gardiner's researches we have now complete knowledge that a plant does not consist, as we used to think, of innumerable particles of protoplasm, separated by cell-wall, but that, in fact, it consists practically of one single mass of protoplasm, of which cell-wall is merely the support. Now the point is this, that in consequence of this knowledge we gain a new or at least an enlarged theory of heredity. In either case it must be an approximate of Darwin's theory known as "pangenesis," which supposes the arrival of gemmules from all parts of the plant to be represented in the formation of the germ. Since protoplasm is connected by means of threads throughout the plant, there is no physical difficulty in the passage of Darwin's gemmules; and I ask, is it not an instance of Darwin's wonderful sagacity that he should have propounded a theory of heredity which to-day is infinitely a better theory than he could ever have known it would be? There is now no longer any need, I think, for that clever theory of Weismann's, known as Weismannism, which supposes the continuity of germ plasma as a plasma separate and distinct from the body plasma. Germ plasma and body plasma are, in fact, intimately connected, and one very important result of this knowledge is that we are free to believe in the inheritance of acquired characters, a thing which Weismann's theory could not permit. Darwin was a strong believer in the inheritance of acquired characters, and I think it may be said now, from what we know of the constitution of the plant, that they are much more likely than not to be inherited. For the above view of the bearing of protoplasmic continuity upon the theory of heredity I have to accept the responsibility, but that we have our present advanced knowledge of the continuity of protoplasm itself is due entirely to the researches of Mr. Walter Gardiner, F.R.S., who has kindly given me a copy of his latest report to the Government Grant Committee of the Royal Society. The knowledge we get is so far-reaching, and must bear I think, so strongly upon the theory of heredity, that I beg to quote as follows from the above-mentioned report, which is dated January 29, 1900:—

"The result may be summarised as follows. Although we have only

partially succeeded with lignified tissue (but the solution of this difficulty is only a question of time), we are in a position to say that we regard the occurrence of 'connecting threads' as universal; and, with the exception of the lignified elements above referred to, we are able to demonstrate the threads in any part of the plant, including the tissues of embryos, and stem and root-growing points.

"The conduction of stimuli and the quick passage of watery solutions, food, and the like 'appears' to take place *via* the threads and across the pit-closing membranes."

With these remarks I leave heredity and return to my principal factors of evolution. The first and the most fundamental was

#### VARIATION.

Variation is quite a familiar thing to every student of nature, and I rather think that its present activity provides the systematic botanist with by far the larger part of his work. You may remember the aphorism that no two blades of Grass are alike. Variation is important, because it is the beginning of all evolution possibilities, whether in nature or in the garden. It provides better or worse forms for competition in the struggle for existence. Variation begets variation. All variation of environment, especially in the matter of food supply, tends to produce variation in the organism. Consider, for instance, the Groundsels and Spurges of South Africa; how they differ from the Groundsels and Spurges of Europe. By crossing and hybridising variation must arise, as indeed we know. All this is fact, but theorising does no harm. If we go to the very beginning of things we have perhaps no right to assume that life plasma must have had originally the power of exact reproduction. The power of approximation to the parent may indeed have been an acquired character. Sex itself may have evolved, some think, in great measure, for the express purpose of producing variation. Weismann refers all variation to sex. Certainly without sex variation could not have been what it is. It is very likely that variation is produced by unknown causes. It appears to be a property of the organism for when the directive influence which keeps up a certain amount of stability is removed, variation at once appears. It is said that in this way we obtain variation in our domestic animals—pigeons, for instance—and the principle is called by Weismann "panmixia." The stability of which I speak may be noteworthy in the case of Egypt, where for long periods, it is said, vegetation has remained unaltered. At any rate such a condition is easily explained. The directive influence of climate has remained the same, and nothing has disturbed the balance. A new influence, a new mould provided, and the vegetation of Egypt would no doubt be found to vary and to flow into that mould.

Secondly, we have the

#### STRUGGLE FOR EXISTENCE.

There is perhaps no phenomenon of nature that is at once so important and so universal as the struggle for existence. Many more plants are born than can by any chance survive. If a tree that lives a thousand years were to produce an offspring that grew to maturity once in a

thousand years, it would suffice to keep up the existing number. But Nature is infinitely more prodigal of increase than that. Reproductive power is enormous, and necessarily there must be a constant war, unpromising though silent, between individuals of the same kind and between individuals of different kinds, between even the vegetable and animal life. You perhaps know the story of Clover, Bees, Mice and Cats. The Clover must be fertilised by bees; but mice destroy the combs of the bees, and if the cats are too few to keep down the mice, bees cannot exist, and the Clover cannot produce seed. This is no exceptional case, and we cannot avoid seeing that nature is inextricably woven together. Some poets sing of peaceful nature—peace where there is no peace, where indeed the plant, the animal that cannot justify its existence by successful struggle, is doomed to extinction. Tennyson made no mistake: he wrote that nature is “ever red with tooth and claw.” The struggle for existence is exceedingly complex and affected by many circumstances; but is it not clear that any variation possessing an advantage must tend to survive, while any variation or original not possessing the advantage must tend to die out? Darwin’s great principle of natural selection must always be at work.

It has been well said that plants do not always grow where they would like to grow, but where they can grow. They are always, as it were, subjected to a tension of circumstances, and we have in this the explanation why it is that sometimes we can find artificial conditions that are better for plants than their natural conditions. You relieve the tension and the plants are benefited. That condition of things was exceedingly well shown by Sir William Dyer in the *Gardeners’ Chronicle* a few years ago, and I do think that the highest skill of the gardener is often shown rather by his correct interpretation of what plants want than by his slavish reproduction of what they are accustomed to have. I recognise, of course, apart from this, that some conditions, necessarily artificial, forbid the application of other conditions that are perfectly natural and possible, or at least require their considerable modification. But this by the way. *Revenons à nos moutons.*

I come at last to the

#### SURVIVAL OF THE FITTEST.

If we admit variation, if we admit the struggle for existence—and surely we do—we must admit, I think, the survival of the fittest. We may look at it in a very simple way. By variation some plants are certain to be more fit, or less fit, than the parent, and some may possess a distinct advantage. The struggle for existence is neither more nor less than a sifting process—I wish to refer to it again as a sifting process—and it is a truism to say that the survivors of the process must be the fittest to survive. The survivors must be those that are too large, too fit, to go through the sieve. It is unnecessary to develop further illustration, and I will only refer you to Darwin’s graphic conclusion of the fourth chapter of his “Origin.” As with a tree, so it is, he says, with the Tree of Life. The green and budding twigs are existing species. Many of the twigs that the tree had in a younger state have succumbed in the struggle of the tree within itself. Of the branches that the tree

had when young few at last remain. His concluding sentence is this : "As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation, I believe, it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications."

I have now shown, so far as I believe to be necessary, what evolution in nature is; but before I deal with garden evolution, and briefly strike a parallel, I should like to justify my reference to hybrids in a state of nature. Do I say that species in a state of nature sometimes originate as natural hybrids? Such indeed is my belief; and, if there were no kind of evidence to be had outside the garden, I believe that this conclusion is inevitable. We know as a positive fact that hybrids are found wild in nature. We know also that in gardens we have hybrids of two extreme types. We have sterile hybrids, so dear to the heart of those who believe in a strict code of morality for plants, of their own prescription, and we have fertile hybrids which behave perfectly, as I shall show, like any so-called pure species. We have, in fact, besides these extremes every intermediate kind of hybrid, and it does appear to me most illogical to suppose that hybrids in nature can only be of one kind, and that of the sterile kind. It is certain, to my mind, that Nature, with all her opportunities and length of days, must have a large number of species, which, if their genesis could be known, would prove to be hybrid. What would happen, supposing that we did casually meet with a wild hybrid, apart from obvious parents, which behaves like the so-called pure species? Simply that we should regard it as an ordinary species, and in this way, I suspect, hybrid origin is often overlooked. Hybrids are often stopped by sterility, no doubt; but it appears likely that in some cases partial sterility may give way to complete fertility.\* Let me show by two instances, from Kerner, how hybrids can and do arise, originating species which take a place not filled by either parent. *Salvia sylvestris* is a hybrid between *S. nemorosa* and *S. pratensis*, growing in dry meadows all over the low country to the south of Vienna. The elevations are composed of boulders and clay, and wherever the latter is present in great quantities, especially on the gentle slopes, *Salvia nemorosa* composes an important item of the vegetation. In the hollows, filled with dark moist earth, *Salvia pratensis* grows luxuriantly. The two kinds of habitat pass into each other, and so the parent species are able to meet. They have produced a hybrid, the *Salvia nemorosa*; and it so happens that it prefers a habitat not liked by either parent. By experiment the hybrid has been proved fertile in a proportion of more than 60 per cent. The other instance I shall give is *Nuphar intermedium*, a hybrid between *N. luteum* and *N. pumilum*. Its distribution extends further to the north than is the case with either parent. Neither can follow it. *N. luteum* drops out first, because its fruits are the latest to ripen. *N. intermedium* ripens its fruit earlier than *N. pumilum*, and can thus extend further north than that species. It is interesting that the hybrid produced artificially in the Botanic Gardens at Königsberg is much less fertile than

\* Darwin instances hybrids between *Ægilops* and Wheat (*Animals and Plants under Domestication*, vol. ii. p. 88).

the natural hybrid growing wild in the small lakes of the Black Forest and in Lapland. The hybrid is said to be most prolific in situations beyond the range of the parent species. Another instance of the hybrid origin of a species, but of which I could not say that it fills a place not filled by either parent, is to be found in *Medicago media*, widely cultivated from its own seed as a fodder plant. Its parents are *Medicago falcata* and *M. sativa*. Interesting experiments have been made with it, and Kerner says that "it would be prejudicial were one of the parent species to supply pollen, seeing that the fertility of the hybrid is diminished thereby."

## II.

Having now dealt, I hope sufficiently, with evolution in nature, the question I have to deal with is whether the same forces are concerned in the production of garden species and varieties, and whether those same forces do entirely account for garden productions. Of course I recognise different circumstances. Variations, for instance, that could not survive in nature are preserved by artificial selection in gardens. But, for my part, I can only answer that we do get all the field and garden kinds, in which we delight and benefit, by the very mechanism which has evolved the present flora of the earth. Evolution in gardens is nothing but the adopted evolution of nature. It is the same thing, and, though we may "touch the button," Nature surely does the rest.

You will remember my three factors:—

1. Variation.
2. The struggle for existence, viz. a sifting process.
3. The consequent survival of the fittest.

Variation is rife in the garden, and by altered and varying conditions is even more frequent, perhaps, than it is in nature. All cultivation tends to produce variation.

The struggle for existence is neither more nor less than a sifting-out process, and that is a process familiar to all who know anything of the inside of a garden. We are always selecting good stocks for seed, and man may be said to do for his purpose precisely what Nature does for her purposes.

The survival of the fittest is the very object and aim of this brain-directed sifting-out process, and so I think that the parallel between Nature and the garden is very fairly exact. We have an artificial selection in the place of natural selection, but both are governed by natural laws and take place in the same way.

But, I can imagine it said, There is a great difference; the result is different; all garden productions are unstable; they revert to original species; your hybrids if not sterile revert in a few generations to the original parents. To this I have a double reply. All those things, so far as they are true, are equally true of natural productions. Nature does not always succeed, so to speak, in her own business. Variations fail; indeed whole hosts of variations must fail to get an initial start; and hybrids, too, no doubt fail very often, as they do in gardens. The other part of my reply is this, that the allegations are not always

true, and are perhaps less often true than is supposed. In any case it appears to me they may be subject to explanation.

Reversions are often a great stumbling-block to many. All the cruciferous races have first of all a strong tendency to deteriorate, and apparently they would finally revert to originals. If they did so revert it would only be natural: conditions would be changed, and original conditions ought to produce the original. I should be surprised, indeed, if such instances could not be found; but nevertheless I have failed, after much inquiry, to get any more than a few authentic cases of complete reversion, either hybrid or not hybrid. Darwin was sceptical upon this very point, and no one ever took more trouble than he did to discover facts. Let me quote from his "Origin," p. 11: "Having alluded to this subject of reversion, I may here refer to a statement often made by naturalists—namely, that our domestic varieties when run wild gradually but invariably revert in character to the original stocks. Hence it has been argued that no deductions can be drawn from domestic races to species in a state of nature. I have in vain endeavoured to discover on what decisive facts the above statement has so often and so boldly been made. There would be great difficulty in proving its truth. . . . It would be necessary, in order to prevent the effects of intercrossing, that only a single variety should have been turned loose in its new home. Nevertheless as our varieties certainly do occasionally revert in some of their characters to ancestral forms it seems to me not improbable that if we could succeed in naturalising or were to cultivate during many generations the several races, for instance, of the Cabbage in very poor soil (in which case, however, some effect would have to be attributed to the definite action of the poor soil) that they would to a large extent, or even wholly, revert to the wild original stock. Whether or not the experiment would succeed is not of great importance for our line of argument, for by the experiment itself the conditions of life are changed."

I would like to suggest an experiment to anyone who has the means of carrying it out. Let the "rogues" from various crops be isolated, and see what comes, after many or several generations, when stability or equilibrium of some kind is reached. I think it very likely that these rogues would not in all cases return by the road along which the parents evolved. I think that very likely there would be some permanent trace of ancestral garden influence. It would be a good experiment; but, to be fair as to the reversion of a kind, would it not be necessary to let the whole crop take its course by crossing together? To take the rogues alone would be selection, and by selection almost any end might be obtained.

I trust now that I carry my argument, and that it is clear that there must be an exact parallel between the evolution of plants in the garden and the evolution of plants in nature. It is no new idea. Dean Herbert years ago believed in the full analogy between garden productions and natural productions. It was never a weakness, I think, that Darwin took account of garden productions; indeed, it seems to me that he might even have deduced his theory from garden productions alone. They all fit well into it.

## III.

I reach, at last, my illustrations, and I beg to point out that any complete enumeration of the cases to be brought under each class is here impossible. Examples only are given. I arrange them in classes according to their behaviour, and I take hybrids first because they seem to need a champion. Hybrid origin, for the moment, appears to me to be in discredit; but I am quite sure that we cannot deny the hybrid origin of species in nature, and I am equally sure that we must not minimise the possibilities of hybridising in gardens, however often and clearly it may have been shown that some reputed hybrids are not hybrids at all. An experienced friend of mine wrote to me: "I do not know of a hybrid reproducing itself true from seed. Do you?" Well, I thought I did know of some, and I feel sure that some instances I have to give are undeniable. I mention this incident in order to show that such instances are well worth giving. In the following list I have endeavoured to give as much independent witness as possible in order that as little as need be might rest on the possible bias of my own opinion.

## A.—HYBRIDS.

## 1.—Bigeneric hybrid, very fertile, and quite true from seed.

*Montbretia crocosmiiflora* (*M. Pottsii* ♀ × *Tritonia aurea*).—These parents have never, I believe, been placed together in the same genus by any author. On the authority of Mons. E. Lemoine and Mons. Mottet the hybrid comes true from seed. The former believes that colour variations could easily be fixed were it not desired to obtain as much variety as possible. This, in my opinion, is not open to question.

2.—Bigeneric hybrids,\* infertile so far as known. *Aloë Lynchi* (*A. albo-cincta* ♀ × *Gasteria verrucosa*), *Urceocharis Clibranii* (*Eucharis grandiflora* ♀ × *Urceolina aurea*), *Philageria Veitchii* (*Lapageria rosea* ♀ × *Philesia burxifolia*).

3.—Species hybrids true from seed (*i.e.* never reverting, even when variable, to either parent). I have not distinguished the hybrids that vary in colour from those which do not vary, because pure species are liable to vary as does the hybrid. For instance, in Devon I have found Primroses in masses of red shades, as well as of yellow colour. Colour variations, too, appear, as a rule, to fix easily.

*Aquilegia cœruleo-chrysantha*.—Vouched by Mons. Mottet, of Verrières.

*Aquilegia Stuarti* (*A. glandulosa* × *Witmanni*†).—This hybrid has been got from seed by Dr. Stuart for the last twenty years.

*Begonia*, the tuberous kinds (*B. Veitchii*, *B. Pearcei*, *B. boliviensis*, &c.).—The parent species here mentioned are absolutely distinct as species. Of the hybrids those with yellow flowers or with marbled leaves show the influence of *B. Pearcei*, while still largely consisting of *B. Veitchii*. Messrs Sutton & Sons inform me that at least 90 per cent. come true, even to colour, from seed.

\* For further list of bigeneric hybrids see "Propagation and Improvement of Plants," by F. W. Burbidge, p. 135.

† = *Aquilegia vulgaris*, var. *olympica* (Boiss.).

*Berberis stenophylla*.—Mr. C. C. Hurst informs me that he has raised 500 seedlings from this hybrid: 90 per cent. have come true to parent; the remainder prove variable, some tending to one grandparent, and some to the other, but not one has completely reverted, all being more or less intermediate. For full account see Hybrid Conference Report, p. 121.\*

*Calceolaria rugosa*  $\times$  *C. herbacea*, Hort.—Vouched by Mons. Mottet. This plant is uncommon, but is used for bedding.

*Canna*.—The beginning of the modern race of large-flowered dwarf Cannas took place, according to Bailey, in 1868, when *C. iridiflora*, of Peru, was crossed by *C. Warscewiczii*, of Costa Rica. This hybrid, familiar to many as *C. Ehemanni*, was again crossed by other species. The existing plant, I understand, does not revert to anything else. Mr. Geo. Paul writes: "Some kinds have certainly a tendency to come near the parent from seed."

*Fuchsia*.—Mr. Banks, writing to Mr. Cannell, says: "As you know, in years gone by I raised many thousands of seedling Fuchsia, but I cannot say I ever remember their reverting to parents."

*Gladiolus*.—*G. gandavensis*, raised from *cardinalis*, *floribundus*, and *psittacinus*, *G. Lemoinei* (*purpureo-auratus*  $\times$  *gandavensis*), *G. Nanceanus* (*Saundersii*  $\times$  *Lemoinei*).—Mr. Ernest H. Krelage writes: "We have never observed the reversion of hybrid *Gladioli* to their parents."

*Hippeastrum*.—The garden Amaryllis. For parents see account by Mr. H. Veitch in the Journal of the Society, vol. xii. p. 248. Messrs. Jas. Veitch & Sons write: "On one occasion our foreman, Mr. Heal, raised seeds of the variety 'Empress of India' by fertilising the stigma of a flower with pollen of the same variety. The resulting plants were all sufficiently identical with the parents to be distributed under the same name." It may here be remarked that a hybrid may vary within itself and yet come true from seed. It is only when it ceases to be itself that it fails to come true.

*Narcissi*.—The Rev. G. H. Engleheart writes me: "Broadly speaking, I should pronounce that hybrid *Narcissi* do not come true from seed. As a rule the seed produces a series of forms showing considerable divergence, and reproducing in varying proportions the back ancestry of the hybrid. But I have been able to see tendencies to become fixed. Thus I have a very fine *N. incomparabilis* of my own raising, named 'Seagull,' a large, tall plant with fine flowers, broad white perianth, and open yellow cup. Seed of this not crossed gives flowers which are all to be called 'Seagulls'—i.e. I could at once see their parentage in their stature, form, and colour. They come near enough to be recognised as 'Seagulls' or the 'Seagull' strain. And I think by seeding from the flowers which come nearest to the 'Seagull' type one could, in a few generations, fix the form." This, of course, amounts to more than is necessary for the hybrid to come true from seed. The hybrid is *N. incomparabilis* (*N. Pseudo-Narcissus*  $\times$  *N. poeticus*), and the hybrid is true from seed so long as that is produced. Variation must be allowed for hybrids as well as for other plants, and, as will be seen elsewhere, hybrid strains as well as

\* Since the above has been printed, Mr. George Paul kindly informs me that he has obtained reversions.

other strains are capable of being permanently fixed. Mr. Engleheart makes some further remarks which I am anxious to quote. Apart from hybrids he says: "I think even species, or, to avoid a debatable word, what I may call simple *Narcissi*, do not come true from seed in cultivation. I have often been struck by the following curious fact. If we get, say, *N. maximus* from its original habitat at the French foot of the Pyrenees the bulbs all give identical flowers, or flowers varying scarcely at all. But flowers self-fertilised from these bulbs brought to my garden immediately give large divergences in their seedlings, many reverting to a very poor weedy type. The same is true of the 'Tenby' Daffodil and others. I believe that their new environment or new conditions generally of cultivation, upset the equilibrium, so to speak, to which the plant has attained in its wild habitat.

*Orchids*.—Mr. C. C. Hurst writes me as follows: "So far as I know only three distinct hybrid Orchids have been seeded from their own pollen, viz. *Paphiopedilum* (*Cypripedium*) *Harrisianum*, *P. vexillarium*, and *Epidendrum* *O'Brienianum*. All came true to type with some variation, but none are recorded as reversions to the ancestral species (grandparents)."

*Papaver somnifero-bracteatum*.—Vouched by Mons. Mottet, of Verrières-le-Buisson.

*Pelargonium*.—Hybrids of *P. inquinans* and *P. zonale*. Vouched for by Mons. Mottet. Pelargoniums 'Christine' and 'Mad. Voucher' are said by Burbidge to produce themselves quite true from seed.

*Pentstemon*.—Reputed hybrids of *P. gentianoides*, with *P. diffusus* and *P. Cobaea*. Vouched by Mons. Mottet. In the Cambridge Botanic Gardens seedlings have been raised for bedding, and certainly there never was a reversion. The large flowered form comes true as to size, and does not produce the small flowered original.

*Petunia*.—Hybrids of *P. nyctaginiflora* and *P. violacea*. Vouched by Mons. Mottet. In the Cambridge Botanic Garden the variety 'Countess of Ellesmere' comes perfectly true from seed, even to colour. Bailey says the *Petunia* affords an admirable example of a hybrid which is abundantly fertile, and which holds its own from year to year. See interesting article, with illustrations, by Bailey, "Survival of the Unlike," p. 465.

*Rhododendron*.—Malayan section. Messrs. Jas. Veitch & Sons write: "Once only has a hybrid variety been fertilised by pollen of the same variety. The seedlings conformed sufficiently to the parent to be distributed under the same name."

*Rhododendron Nobleanum* (*R. caucasicum* × *arboreum*).—Vouched by Mr. Lindsay.

*Senecio* (*Cineraria*) *Lynchi* (*Senecio multiflorus* ♀ × *Garden Cineraria*).—In the Cambridge Botanic Garden few seeds are produced; but Mr. J. K. Budde, of the Botanic Garden, Utrecht, informs me that it produces plenty of seed with him, and reproduces itself.

*Senecio vulgaris* × *S. squalidus*, or reciprocal.—This hybrid, I believe, must come under the head of those able to reproduce themselves true from seed. The original seed was sent me by Mr. F. W. Burbidge, and being mixed probably, as the plants were, according to his account in the *Irish Naturalist* of November 1897, p. 300, produced naturally a crop of

more than one single form. It was raised by Miss E. R. Saunders in her garden, and she informs me that she could arrange her plants in two sets, the one consisting practically of *S. squalidus*, and the other of an intermediate. From this intermediate seed was saved, and I have raised from this seed about one thousand plants, every one of which is like every other, without any evidence of a tendency to vary. There is no doubt, I think, that seed gathered from this crop will produce precisely the same plant.

*Streptocarpus*.—Vouched by Mons. Mottet. Mons. Mottet regards these hybrids as coming true from seed indefinitely. Mr. Watson writes: "I am disposed to believe that if we ceased to interfere with the breeding proclivities of these plants we should get back to *S. Rexii* pure and simple." Messrs. Jas. Veitch & Sons write: "As no insect life, of which the agency is available, exists in our houses, the plants if left to themselves are practically sterile, and hence reversion to *S. Rexii* or any other species cannot be proved. All our seed has been obtained by the artificial fertilisation of selected varieties. This much is certain: a white variety pollinated from a white variety produces white varieties; similarly for red and magenta coloured flowers, usually with some improvement in the colour. There is thus here a certain degree of constancy."

*Verbena*.—Reputed hybrids of *V. chamærifolia*, *V. incisa*, *V. phlogiflora*, and *V. teucrioides*. Vouched by Mons. Mottet.

*Viola* (*V. cornuta* × 'Blue King Pansy'). Vouched by Dr. Stuart. Dr. Stuart kindly gives me an account of the production of his strain by crossing as above. He says: "There may be something in what you say about hybrids reverting to the type, but I have not found it so."

*Roses*.—Mr. Geo. Paul writes me:—"In Roses the H.P. 'General Jacqueminot' type after some generations virtually reproduced themselves. Witness a seedling from the 'General' named 'Maurice Bernardin.' Seedlings from it were sent out as new distinct kinds, in perfect good faith, which after being exhibited proved too much alike to the parent. In fact, the type grows so reproductive of similar flowers that we gave up breeding from it in despair.

Bailey quotes the following genera as producing hybrids, which come very true from seed:—*Aquilegia*, *Begonia*, *Cereus*, *Cirsium*, *Dianthus*, *Erica*, *Geum*, *Hieracium*, *Hippeastrum*, *Lamium*, *Lavatera*, *Lunaria*, *Salix*, *Veronica*. Hybrids of *Erica* and *Salix*, he says, produce a progeny as pure as a pure species.

Messrs. Jas. Veitch & Sons conclude their letter with this remark: "On the whole the few cases stated above seem to imply a certain amount of constancy." This applies, I believe, to cases in which the progeny of a hybrid was so nearly identical with the parent that all the plants could be distributed under the same name. It does not appear to have occurred to them that a hybrid type, however much it might vary, could ever lose its character.

Mons. E. Lemoine writes that he has never observed the reversion of a hybrid to either of its parents. He believes that races of hybrid origin may be fixed just as races are that are not of hybrid origin. This appears to express the general opinion.

Very interesting experiments in the hybridisation of Wheats were made some years ago by the late Mons. Henri de Vilmorin, and the results have some considerable bearing upon the subject in hand. I may here quote the crosses made both ways between *Triticum sativum* and *T. Spelta*, because both kinds are recognised by the "Index Kewensis" as specifically distinct. In both cases the hybrids were perfectly fertile, the characters were intermediate, and there was no return to either parent. The next sowing (the second generation of the hybrid, in which variation and reversion so often appear) did produce variation, but still without return to either parent. This information I have from a pamphlet kindly sent me by Mons. Philippe de Vilmorin, extracted from the "Bulletin de la Société Botanique de France," tome xxvii. p. 358.

The following notes are of interest, but both parents are regarded by the "Index Kewensis" as belonging to the species *T. vulgare (sativum)*. They are from the same pamphlet. In conclusion, with reference to these three following crosses, Mons. H. de Vilmorin draws attention to the evidence of what Mons. Naudin has very justly called the "variation désordonnée" of plants obtained from crosses between forms somewhat distant from one another. Then he says that, like Mons. Naudin, he has found this variation in the second generation. The result of the hybridisation is an intermediate plant; but in the next generation suddenly appear characters which are quite different from those of the parents: heredity suffers a great disturbance. Attention is next drawn to the appearance of characters which belong to neither parent, but which do belong to other kinds of Wheat. If, then, he says, these forms can be fixed in their present characters, it will be very difficult to doubt that most of the races of Wheat, commonly regarded as distinct species, can only be but variations of one and the same plant. Such, indeed, is likely to be the case (must be the case, if we consider a sufficiently remote period); but, in my opinion, some of these variations have attained the rank and condition of species.

*T. sativum* var.  $\times$  *T. durum* var.—Two plants were first obtained, the one quite like the other. The crop from these plants, however, gave the most diverse forms. No two plants were alike, and not one produced the character of either parent. There were plants referable to both the parent species, but others referable to *T. turgidum*, and still others approaching to *T. Spelta*, which is surprising in a descent from *T. sativum* and *T. durum*.

*T. sativum* var.  $\times$  *T. turgidum* var.—The two plants obtained were strikingly like those of the preceding cross. Resown they produce the most curious mixture of Wheats, dwarf and tall, with and without awns, spikes extraordinarily thin or excessively compact. Above all to be remarked was the production, in each lot, of a Wheat which presented all the characters of *T. durum*, but without awns—a thing having no example in that species.

*T. sativum* var.  $\times$  *T. turgidum* var.—The one plant selected out of five or six showed the influence of the male parent only by slightly increased enlargement or swelling (*renflement*) of the spikelets, by their irregular disposition upon the axis, and by the rudiments of awns towards the apex of the spike. From this one plant came Wheats of all sorts,

with and without awns, and among them, strange to say, a marked tendency is to be observed of approach to the forms derived from *T. Spelta*.

4.—Hybrids that are more fertile than either parent: *Senecio Tussilaginis* ♀ × *cruentus*—own experience; *Senecio cruentus* ♀ × *Tussilaginis*—own experience; Burbidge, "Propagation and Improvement of Cultivated Plants," instances, hybrids of *Calceolaria*, *Erica*, *Dianthus*, *Pisum*.

5.—Quite sterile hybrids: *Begonia* 'Gloire de Lorraine' (*B. socotrana* × *B. Dregei*)—voucher, Mons. E. Lemoine; *Begonia* 'Gloire de Seaux' (*B. socotrana* × *B. subpeltata*)—voucher, Mons. E. Lemoine; *Dianthus eminens* (*D. alpinus* × *deltoides*)—Mr. Lindsay; *Dianthus Lindsayi* (*D. alpinus* × *barbatus*)—Mr. Lindsay; *Delphinium MacNabianum* (*D. nudicaule* × *cashmirianum*)—Mr. Lindsay; *Phlox lilacina* (*P. frondosa* × *Nelsoni*)—Mr. Lindsay; *Rhododendron Lindsayi* (*R. Dalhousiae* × *Gibsoni*)—Mr. Lindsay; *Rhododendron*, unnamed (*R. ciliatum* × *Edgworthi*)—Mr. Lindsay; *Syringa* 'La Lorraine' (*S. persica laciniata* × *vulgaris fl. pl.*)—Mons. E. Lemoine; *Syringa varina duplex* (*S. persica laciniata* × *vulgaris fl. pl.*)—Mons. E. Lemoine.

6.—Hybrids the descendants of which return to the parent species. Several authorities remark that reversions are characteristic rather of crosses than hybrids. Bailey says, in "Plant Breeding," p. 251, quoting from Focke: "The nearer the parent forms are related to each other, the progeny of crosses show complete return to the parent forms." It is curious, considering the belief some have in a general tendency to reversion, that under this head I have found it difficult to get authenticated examples.

*Cucumis Melo* × *trigonus*.—According to Naudin the descendants of this hybrid revert to one or other of the parents.

*Dianthus superbus* × *D. sinensis*.—Mons. P. de Vilmorin writes: "Two years ago we pollinated *D. superbus* by *D. sinensis*. The first year the plants grown from seed gave a perfect hybrid, a perennial with thick straight stems like the *D. superbus*, and large flowered like the *D. sinensis*. But this year (second generation) almost all the plants are reverted to *D. sinensis* and are annuals. As you know it is generally at the second generation that the greatest difference between plants coming from the same fecundation is to be observed."

*Primula*.—Messrs. Sutton & Sons write: "We have occasionally obtained fertile crosses between *P. sinensis* and *P. floribunda*, *P. obconica*, and *P. sinensis*, and *P. Auricula* with *P. sinensis*, but the progeny, though different in some respects from the female parent, was most like it, and its seed produced plants which showed no distinction at all from the original female parent."

WHEATS.—Hybrids of *Triticum polonicum* and *T. turgidum* have been said to revert, and I am informed by Mons. E. Lemoine that the late M. Godron, director of the Botanic Gardens at Nancy, was of opinion that Wheats do revert. I am not aware of the particular cases in question, but observations by Mons. H. Vilmorin, so far as I know them, appear to indicate the contrary.

7.—Wild hybrids.

A.—Found in company with both parents only, so far as known: *Cistus florentinus* (*C. monapeliensis* × *salvifolius*), *Cistus ledon* (*C. monspessulanus* × *laurifolius*), *Cistus longifolius* (*C. monspessulanus* × *populifolius*), *Linaria stricta* (*Linaria striata* × *vulgaris*), and occurs with both parents in West of Europe, *Saxifraga luteo-purpurea* (*S. aretioides* × *calyciflora*), *Saxifraga ambigua* (*S. aretioides* × *calyciflora*), *Saxifraga caesia* × *mutata*, *Saxifraga Aizoon* × *cuneifolia*.

B.—Found in company with one of the parents only. This "often happens," *Epilobium scaturiginium* (*E. alsinaefolium* × *palustre*), *Primula brevistyla* (*P. vulgaris* × *officinalis*) sometimes found without either parent, *Prunella hybrida* (*P. laciniata* × *vulgaris*), *Linaria stricta* (*Linaria striata* × *vulgaris*). About Montpellier, the last mentioned is found only with *L. striata*.

C.—Wild hybrids which take the position of species and are established independently of either parent, *Betula alpestris* (*B. alba* × *nana*). Entire copses are found in the Jura, *Nuphar intermedium* (*Nuphar luteum* × *pumilum*), *Rhododendron intermedium* (*R. ferrugineum* × *hirsutum*), *Salvia sylvestris* (*Salvia nemorosa* × *pratensis*), *Primula brevistyla* (*P. vulgaris* × *officinalis*).

D.—Hybrids of interest, which for want of information cannot be classified as above: *Aceras* with *Orchis*, *Coeloglossum* with *Orchis*, *Epipactis speciosa* (*Epipactis rubiginosa* × *Cephalanthera alba*), *Equisetum inundatum* (*E. arvense* × *limosum*), "a rather common hybrid," *Gymnadenia* with *Orchis*, *Himantoglossum* with *Orchis*, *Nigritella suaveolens* (*Gymnadenia conopsea* × *Nigritella nigra*), common in the Central Alps, *Primula salisburgensis* (*Primula glutinosa* × *minima*).

One or two questions, I think, are suggested by these hybrids. In the first place ought we to question, with a view to alteration, the generic or specific position of parents when they produce a fertile hybrid progeny? *Montbretia Pottsii* and *Tritonia aurea* (according to the "Kew Index," *Tritonia Pottsii* and *Crocosmia aurea*) have never been regarded, I believe, as belonging to the same genus, and yet they produce the very fertile progeny *Montbretia crocosmiflora*. Or, to put the same question another way, is it possible to use the power of crossing, or the absence of it, as any test of generic or specific distinctness? There does indeed appear to be difficulty, because on the one hand plants of very divergent character will sometimes cross, while, on the other hand, very similar plants will not always do so. If we sort our plants into species and varieties according to the highest authority, according to the best evidence we know of genetic affinity, and then sort them out according to their behaviour in breeding, or not breeding, together, the result is entirely different. We might adopt the latter method, but the result would sometimes be curious. Really distinct genera ought not, I suppose, to cross at all but *Cereus* and *Phyllocactus*, *Urceolina* and *Eucharis* respectively, very distinct genera, according to usual views, do cross. It is interesting, however, to make the observation that seedling *Phyllocacti* are quite like young plants of *Cereus*, and leaves of *Urceolina* are much like those of *Eucharis*, though in the first case the plant, and in the latter the flowers, are enormously different. Among instances of very near allies

not crossing we have forms of Maize quoted by Darwin, and *Silene inflata* var. *alpina* with var. *angustifolia* and var. *latifolia* with var. *littoralis* quoted by Sachs. There is also the difficulty that plants will sometimes cross one way but not the other, or the fertility of one union is greater than the other. Sorauer remarks that while the pollen of *Orchis Morio* will not even produce a tube on the stigma of *Orchis fusca*, yet pollen of *Orchis fusca* actually fertilises the egg-cell of *O. Morio*. Goertner says that *Nicotiana paniculata* is fertile with pollen of *N. Langsdorfi*, but that the reverse cross cannot be made. It is the same with species of *Mirabilis*, explicable perhaps in that case by the inability of the pollen tube of the one to traverse the long style of the other. A further difficulty may be mentioned in the fact that plants sometimes refuse to cross with their known allies and yet prove fertile with removed species. The late Anderson Henry, speaking of *Rhododendron jasminiflorum*, said: "While it rejected so many of its legitimate brethren of the *Rhododendron* tribe, pure and simple, I was somewhat surprised that it took kindly with my hybrid *R. ciliatum* crossed by *R. Edgeworthi*." Also of the same species he wrote: "It again rejected its more natural allies and formed a union with the Indian Azalea." From these remarks it will be evident, I think, that we could not depend upon knowledge of the power of crossing or not crossing together as a guide to classification.

Another interesting question, especially after the foregoing considerations, is whether we can make any distinction between hybrid and cross. Certainly we may for the sake of convenience call a plant a hybrid, when it is descended from two plants which we regard as specifically distinct, and we may call a plant a cross which is descended from plants which we look upon as varieties or forms of the same species. But species and varieties themselves are judgments, as Asa Gray used to say, and the terms apply rather to an abstract idea than to a concrete fact, and, apparently to be quite logical, we can get no further with the terms hybrid and cross. At any rate genetic affinity and sexual affinity are not concurrent, so that a cross from the one point of view might be a hybrid from the other. Focke used the one word *Mischling* for both hybrid and cross, and, apart from convenience, it would be better, probably, to use one term in a similar way. I introduce no new idea. Herbert long ago, and Naudin more recently, after many experiments, formed the opinion that it was impossible to draw the line between the cross and the hybrid. Any feature of the one may be a feature of the other.

### B.—NOT OF HYBRID ORIGIN.

From hybrids I pass to illustrations that are not of hybrid origin. To this class belong all the most anciently cultivated of domestic races. From the earliest period, when man began to cultivate, there must have been going on a process of selection, and to such an extent has the resulting evolution proceeded, that to-day we are unable to point out the originals of many of our most useful plants. New species have certainly been established, which must, at the very least, rank with species that have been evolved naturally. I do not think that a new genus has arisen, although it has been suggested that *Zea*, of which no wild species is known, has been evolved from *Euchlœna* (*Reana*). Of this, in my opinion,

we require more evidence, because the differences between the two genera (according to description) are such that no human interest is likely to have evolved directly or indirectly. It has been sought, I believe, to establish a new genus upon some strain of tuberous *Begonias*, but I question whether the difference relied upon is any greater than differences already existing in the genus *Begonia*. The difference between species and genus is only one of degree, and of species there is quite a sufficient number for the illustration of evolution.

Wheat, Barley, Rye, and Oats are all the result of domestic evolution, and I need hardly say that evolution is proceeding to-day as fast as selectors and breeders can push it forward. An interesting case we have in the Opium Poppy (*Papaver somniferum*), an evolute from *Papaver setigerum*. The Olive, Rice, Potato, and Grape Vine are all forms of cultivation.

Mons. Alphonse de Candolle has written a very interesting book upon the origin of cultivated plants, limited, however, to what we call economic plants. I have said that the process of evolution has been pushed so far that we cannot now recognise the originals. I do not say that this process accounts for all our ignorance of the origin of long cultivated plants; but it does, I believe, account for much of our ignorance. It does not account for such cases as *Arachis hypogæa*, *Arracacha esculenta*, *Saccharum officinarum*, and *Sechium edule*. The following list (not intended to be complete) I extract from De Candolle's book, and from the sectional headings opinion may be formed with regard to the plants beneath. In some cases the originals have become extinct, or may yet be found.

Seen and gathered in the same condition, but by a single botanist in a single locality:—

*Cucurbita maxima* (Melon Pumpkin).

*Vicia Faba* (Broad Bean). It has been suggested that this is a derivative from *V. narbonensis*. I think it unlikely.

*Nicotiana Tabacum* (Tobacco).

Seen and mentioned, but not collected, in the same condition by one or two more or less old non-botanical authors, who may have been mistaken:—

*Triticum vulgare* (Wheat).

Gathered wild by botanists in several localities under forms slightly differing from the cultivated plants, but which most authors do not hesitate to class with the same species:—

*Olea europæa* (Olive).

*Oryza sativa* (Rice).

*Solanum tuberosum* (Potato).

*Vitis vinifera* (Grape).

Gathered wild by botanists in several localities under forms considered by some authors as distinct species, and by others as varieties:—

*Allium Porrum* (Leek).

*Cichorium Endivia* (Endive).

*Crocus sativus* (Saffron Crocus).

*Cucumis Melo* (Melon).

*Cucurbita Pepo* (Pumpkin Gourd).

*Helianthus tuberosus* (Artichoke),  
*Lactuca sativa* (Lettuce).  
*Lycopersicum esculentum* (Tomato).  
*Papaver somniferum* (Opium Poppy).  
*Ribes Grossularia* (Gooseberry).  
*Solanum Melongena* (Aubergine).  
*Spinacia oleracea* (Spinach).  
*Triticum monococcum*.

Subspontaneous differing enough from the cultivated plants to be regarded by most authors as different species :—

*Allium ascalonicum*.  
*Allium Scorodoprasum*.  
*Secale cereale* (Rye).

Subspontaneous similar to cultivated forms, but possibly escaped from cultivation :—

*Amygdalus persica*.  
*Avena sativa* (Oat).  
*Avena orientalis*.  
*Cucurbita moschata*.  
*Gossypium barbadense* (Cotton).  
*Holcus Sorghum*.  
*Lepidium sativum* (Cress).

Not known wild, or even half-wild, derived perhaps from cultivated species at the beginning of agriculture, but too different not to be commonly regarded as distinct species :—

*Hordeum herastichon*.  
*Hordeum vulgare* (Barley).  
*Triticum Spelta*.

Not found in a wild state or even half wild, but originating in countries which are not sufficiently explored :—

*Brassica chinensis*.  
*Capsicum annuum*.  
*Citrus nobilis*.  
*Pisum sativum* (Common Pea).  
*Zea Mays*.

At the time of writing his book, which was published in 1883, De Candolle's figures were twenty-seven kinds doubtful, or half wild, and twenty-seven not found wild. These numbers have since been slightly reduced.

Let me bring to your notice quite a recent case of what Bailey regards as the origin of new species. In his "Survival of the Unlike" he figures several of the accepted species of the genus *Lycopersicum*, the Tomato genus. Then he draws attention to the 'Upright' and the 'Mikado' types of Tomato, and he points out that they are as much or even more different from each other and from their own common parent, than are the other long accepted species from one another.

Further examples from the same author are several kinds of Maize and Beans.

The Soy Bean, described by Maximowicz under the name *Glycine*

*hispida*, is undoubtedly an evolute from the wild *Glycine Soya* of China and Japan.

Mr. Burbidge kindly draws my attention to the formerly dioecious habit of the garden Strawberry, which, in this country, is now self-fertile. Mr. Keen, the famous Strawberry grower in 1809, made the mistake of removing all his male plants, and, having discovered the necessity of keeping them, planted about one male to ten females as the most profitable proportion. Mr. Keen wrote: "Some Strawberry plants have both male and female flowers on the same plant. These are not so profitable, and I find it more advantageous to raise my plants from seed than by suckers. Now, of course, we do not trouble about male plants of the Strawberry. In America, I believe, there is still some inconvenience on account of the dioecious nature of the Strawberry."

#### RACES THAT COME TRUE FROM SEED.

Mons. Mottet obliges me with the following list of those which he considers to "come true for any number of years":—

Brussels Sprouts	Endive
Cos Lettuce	Broad-leaved Endive (Scarole)
Cardoon and Artichoke	Cereals.
<i>Celosia plumosa</i>	

Parsley and Cabbage Lettuce ("All the year round") appear to come quite true from seed in my own garden.

The Gloxinia and Chinese Primula appear to afford examples of perfect fixity. Mr. Leonard Sutton writes: "With reference to Fern-leaved Primulas, for all practical purposes the Fern-leaved strain may be considered in most varieties to be absolutely fixed, in fact in one or two varieties I never remember a palmate-leaved plant sporting from a Fern-leaved parent, but I cannot say that I should be surprised, even in the most fixed variety, to see one now and then. Of course many Fern-leaved varieties that have not long been in existence, and which originated from the other type, will for many years continue to throw palmate leaves."

Mr. Burbidge kindly refers me to Cyclamen and Mignonette under this head.

Mr. Benary writes me that "Asters never revert to anything like the original *Callistephus chinensis*."

Bailey writes in "Plant Breeding," p. 90:—"There is no reason why the tree fruits should not reproduce themselves from seeds just as closely as the annual herbs do. . . . There is excellent proof of this in the well marked races or families of Russian Apples. In that country grafting has been little employed, and consequently it has been necessary to select seeds only from acceptable trees in order that the offspring might be more acceptable. Most of the seedlings of the Duchess of Oldenberg are recognisable because of their likeness to the parent. The 'Fameuse' type of Apples tends to perpetuate itself, and a similar tendency is very well marked in the Damson and Greengage Plums, the Orange Quince, Concord Grape, and Hill's Chili and Crawford Peaches."

Mons. Henri de Vilmorin writes in the "Bulletin de la Société Botanique de France," tome xxxv.:—"The production of true 'Blés

'tendres' (*Triticum sativum*) from a 'Blé dur' (*T. durum*) and a 'Poulard' (*T. turgidum*) seems to show that the different forms of Wheat are descended from a single species." These forms thus spoken of have been regarded as perfectly distinct species, and, according to the view expressed by Mons. H. de Vilmorin, they must be species evolved by artificial selection. They appear to me to behave quite in the manner of distinct species when crossed. (See p. 28.)

*Lobelia Erinus*.—If the variety *speciosa* is a derived plant, as I believe, I can vouch for the fact that Veitch's stock comes very true from seed.

#### ABNORMALITIES THAT COME TRUE FROM SEED.

*Campanula Medium calycanthema*. Vouched by Mr. F. W. Burbidge.

*Celosia cristata*, the Cockscomb. Vouched by Mr. F. W. Burbidge.

*Chelidonium majus laciniatum*. From Prof. de Vries.

*Chrysanthemum segetum fistulosum*. From Prof. de Vries.

*Juncus effusus spiralis*. Observed true from seed by Mr. Lindsay, of Edinburgh, and myself.

*Pisum sativum umbellatum*. Own experience for number of years.

*Polemonium ceruleum fastigiatum*.

*Streptocarpus Rexii Peloria*. Raised by myself for a number of years in succession. It originated in the Cambridge Botanic Garden.

Abnormality may well be described as variation which Nature does not find useful. It is a condition we know of only by comparison with usual structure.

#### RACES THAT REVERT.

Mons. Mottet instances the following as "known to revert in a few generations"—

Radishes	Squashes
Turnips	Cucumbers
'Arrots	Peas
Melons	French Beans.

It is necessary here to observe that deterioration is not the same as reversion to original parent. The garden Pea, for instance, according to De Candolle, has never been found wild, and he says it is perhaps only a modification of *Pisum arvense*, obtained by cultivation. In this case I think it may be a very good example of a species evolved in cultivation.

Mr. J. W. Moss, seed grower, of Feering, in Essex, gives me a case of complete reversion in precise terms so far as rogues are concerned. He says: "We have found Broccoli to revert entirely to a wild state and cease to produce anything whatever of a head." From the same gentleman I have valuable information which comes under this section. He says: "I believe all the Crucifers are much alike in this respect, except, perhaps, 1000-headed Kale, Rape, and a few of such commoner varieties which one would imagine have advanced but little from the original. Onions I have found to degenerate very soon, and many bull-necked plants appear which form no bulb, and which look very much like reverting. Lettuce, Beet, and some Peas very soon go back, to become almost unrecognisable, especially Beet. Some Peas of the finest and best varieties continually

produce poor small tight podded plants of apparently no relation to the parent. Celery will quickly deteriorate, and I believe revert. In Brussels Sprouts, if the stock is not kept up by very careful selection, the crop quickly loses uniformity, then a number of very loose and open sprouts will appear, plants with bare stems, and others more resembling 1000-headed Kale, with a Brussels Sprout top; and the longer seed from such plants is sown the more quickly good plants will disappear. In Broccoli-crops I have frequently found that when after many years' careful selection we have brought the crops up to a point of uniformity and perfection, every plant being as good as we could desire, that the seed from such plants will produce like plants, equally perfect, with the exception that here and there will appear a plant perfectly wild, bearing no resemblance to a Broccoli, but prepared to produce perhaps ten times as much seed as the good plants. The better the crops the worse the rogues. Where a crop is very indifferent it will be so more generally and perhaps without any such very wild rogues as the one or two that are wrong in an otherwise perfect crop." Cabbage, Radish, Parsnip, Mangolds, and Turnips Mr. Moss speaks of as rapidly losing character. He says: "I may mention that severe or unsuitable weather and blight affects the better plants to a greater degree than the inferior, which are more hardy; and when one takes into consideration the preponderance of seed which will be produced from the latter it is easily understood how nature assists this reverting process."

Messrs. Sutton & Sons write:—"All the Brassica plants, such as Brussels Sprouts, Broccoli, Cabbage, Kohl Rabi, and Turnip, would, if allowed to seed themselves, most certainly revert in time to the wild form. I cannot give you an instance of this: my only reason for being so certain in the matter is the immense care required in selection to keep them up to their present standard. Broccoli and Cabbage grown out of season soon run out of character, and with many of these plants it is not only selection, but system of cultivation that keeps them to their present type."

Mr. H. Deverell, seed-grower, of Banbury, writes:—"Onion bulbs for seed purpose should be carefully selected each year previous to the planting season, otherwise the stock would degenerate and become mixed. According to my observations the 'rogue' in every instance reverts to one of its parents, and, however precise you may be in your selection, there are sure to be a proportion of rogues, which I should estimate at 10 per cent. to 15 per cent. This applies to all varieties of Onions. A case in point: I only plant deep globe-shaped bulbs of 'Ailsa Craig,' but the produce from the seed is certain to contain a percentage of flat-shaped Onions, although for the past twelve years I have with rigour discarded bulbs of the latter type."

It would seem, possibly, to some, that these quotations are rather against the theory of evolution, but I am sure that this conclusion does not by any means follow from the evidence. Natural evolution proceeds no doubt, if I may so express it, along the lines of least resistance. There may be great resistance in these particular cases, but the explanation lies, I think, to a large extent in the very likely fact that selection has proceeded much faster than fixation has been able to follow. We

know, for instance, that a new strain is often very long in being fixed, but that at last it does become fixed; and so, I think, it may be with regard to these vegetables. Moreover we have to remember that these crops are all very highly cultivated, and that the conditions are such as to induce a very active variation. We have therefore no right to be surprised if variation should take the backward track—a track in most cases so recently made. After all, does the deterioration, or reversion, of which I have shown evidence occur as a rule in any more than an extremely small percentage of individual instances? We hear a great deal of it from seed-growers, and yet it is rarely complained of in private gardens. Might not reversion be corrected in *some cases* if rogues were allowed to cross with the rest of the crop? Its standard would, of course, be lowered, but it might still remain at a considerable but safe height of evolution, where it would stand with practically no tendency to the production of “rogues.” This is all that the process of evolution requires, but as far as I know there is no evidence to be had on the point. In any case I hold the view that evidence against the theory of evolution can no more be taken from the behaviour of such highly cultivated and selected stocks than could the height of sea level be measured from the crest of a wave or trough of the sea.

My best thanks are due to the following gentlemen, who were so kind as to answer my inquiries:—Mr. E. Banks, Shelden; Mr. Ernst Benary, Erfurt; Mr. J. K. Budde, Utrecht; Mr. F. W. Burbidge, V.M.H.; Mr. Caunell; Messrs. Clibran & Son, Altrincham; Mr. H. Deverill, Banbury; the Rev. G. H. Engleheart, V.M.H., Appleshaw; Mr. C. C. Hurst, Burbage, Hinckley; Mr. Ernst Krelage, Haarlem; Mr. E. Lemoine, Nancy; Mr. R. Lindsay, Murrayfield, Edinburgh; Mr. J. W. Moss, Kelvedon, Essex; Mons. Mottet, of Messrs. Vilmorin's establishment at Verrières; Mr. G. Paul, V.M.H.; Mr. Leonard Sutton; Mr. Rolfe, of Kew; Dr. Stuart, Chirnside, N.B.; Mons. Philippe de Vilmorin; Messrs. James Veitch & Sons; Mr. W. Watson, Kew.

I can only regret that unavoidable limitation has prevented the use of much valuable information.



## OBSERVATIONS ON SOME OF THE PLANTS EXHIBITED.

By the Rev. Prof. G. HENSLOW, M.A., V.M.H., &amp;c.

[APRIL 10, 1900.]

**CUT-LEAVED ELDER.**—The foliage of *Sambucus racemosa* illustrated an unusual method of an attempt to form a bipinnate leaf. Compound leaves are derived from simple ones by first forming lobes, by means of incisions more or less deep between the chief lateral ribs. Then, when the tissue is completely arrested, quite separate leaflets are formed. In the above species of Elder, as in the cut-leaved forms of *Coleus*, the incisions are made by deepening the marginal serratures.

**HYBRID NARCISS.**—Besides the *Incomparabilis* group, formed by *N. poeticus* × *N. Pseudo-Narcissus*, Mr. Engleheart exhibited forms between *N. poeticus* and *N. Tazetta* which bore the flowers in clusters after the latter species. The purple rim combining with yellow had in many cases produced an orange cup.

**PHALÆNOPSIS.**—The pollen mass of this genus has a peculiarity which has not been hitherto noticed, in that the caudicle or supporting membrane, when the pollinium is first withdrawn, is too long to hit the stigma. It consequently contracts forming a bend in the middle, and so shortens the distance.

**DOUBLE AZALEA.**—A Japanese species had the stamens converted into a perfect gamopetalous corolla resembling, but distinct from, the so-called “hose-in-hose.” For in *Prinroses* and *Mimulus* the calyx is in that form converted in a perfect corolla. But in the Azalea the calyx was unaltered, though rudimentary as usual, while the second corolla was formed from the stamens only.

**ANEMONE CORONARIA.**—Mr. Henslow drew attention to the great variety of colours which this species bears in the wild state; though specimens from Malta were always uniformly of a purple-blue colour, illustrations from Palestine showed that it varied from that to pink and scarlet. In the Riviera double forms were apparently wild.

**ALPINE PLANTS.**—A fine collection exhibited by Mr. Purnell afforded material for remarks on this interesting group. The three representative genera are *Primula*, *Gentiana*, and *Saxifraga*. Of these we have *P. farinosa* and its probable alpine variety, *P. scotica*, both with a mealy foliage like *P. denticulata* and others. Of *Gentians*, *G. nivalis* of Clora Mountains represented the true Alpine types, while several species of *Saxifrage* are found on our own mountains, as well as *Thalictrum alpinum*, also in Mr. Purnell's collection.

The peculiarity of some species laying their leaves flat upon the ground, as of *Morisia hypogea*, was explained as a result of thermotropism: the recumbent position of the leaf, as well as the prostrate habit of the stems of many alpine creeping plants, is caused by the temperature being always higher on the ground than just above it in such localities. A similar habit is seen in our own Daisies and Plantains in a tennis lawn.

## CULTIVATION OF THE NARCISSUS IN GARDENS.

By Rev. S. EUGENE BOURNE, M.A.

[April 24, 1900.]

THE numerous varieties of the Narcissus supply a very real need in our gardens and occupy a prominent position in the year's procession of beautiful flowers. Growing hardily in the open ground they delight us at a time when cut flowers from the open border are very scarce; many of them rival in beauty the choicest treasures of the greenhouse and hot house; with accommodating persistence they bloom in succession for nearly a quarter of the year—*i.e.* (in ordinary seasons) from the beginning of March to the middle of May—without exacting from us any trouble and expense in supplying them with artificial heat; when cut their flowers (most of them) last in water for ten days, or even more, before they fade; and although there is a certain amount of truth in the objection that it is easy from a large collection to pick out a number of sorts which are rather similar in character, it is still easier to select a very large number which are far more distinct from each other than Rose from Rose, and Carnation from Carnation. Their elegance, grace, and beauty are ravishing. The Narcissus may truly be called the king of the spring garden, and all who have a garden should do homage in his court, and at the same time satisfy their own love of the beautiful by growing a well-chosen collection.

The task I set myself in this paper is to increase the number of cultivators of this delightful flower by showing that there is no real difficulty in its cultivation; that what is needed is (as in all kinds of successful effort) a careful attention to details. My paper will be a very simple one. I do not presume to instruct expert growers. In Narcissus growing, as in most things, there are differences of opinion, so I do not wish to dogmatise too much; but for the assistance of those who at present know little or nothing about the matter I shall lay down a few easy rules which in my own experience I have found sufficient to secure a very satisfactory measure of success. I shall also offer a little advice as to what are the most desirable varieties to grow, for when I began Narcissus growing myself I should have been saved much expense and many disappointments if I had had some such guidance.

If any scientific expression should be used in this paper in a popular rather than a scientific sense I crave indulgence from the scientific.

In the Narcissus family there are three main groups distinguished by the size (and shape) of the corona of the flower—(I.) the Magni-coronati, (II.) the Medii-coronati, (III.) the Parvi-coronati. The Magni-coronati are the large or long-crowned Narcissi, called Trumpet Narcissi, from the trumpet-like shape of the corona. These are the true Daffodils. The Parvi-coronati are the small-crowned varieties: their crown is of a flat, saucer-like shape. They are the true Narcissi. Intermediate between these two groups—the result of hybridisation (natural or artificial) between them—come the Medii-coronati, with crowns of intermediate size

and shape. They are called the Chalice-cupped or Star Narcissi, from the appearance (respectively) of the crowns and the perianths.

(I.) The most interesting subdivisions of the Magni-coronati, or true Daffodils, are (1) the self-yellow Daffodils, (2) the bicolor Daffodils, and (3) the white or sulphur Daffodils. They vary considerably in their degrees of vigour of constitution. (4) The other subdivision—viz. the Hoop-petticoat Daffodils, with curiously shaped trumpets and insignificant perianths—is perhaps not so interesting to the ordinary grower.

(II.) The Medii-coronati are arranged in a considerable number of subdivisions of which the most popular and beautiful are the Leedsii (or white Eucharis-flowered Narcissi), the Incomparabilis, the Barrii, the Triandrus and Odorus classes. The great majority of these are very vigorous in constitution.

(III.) The more important divisions of the Parvi-coronati, or true Narcissi, looked at from a gardener's point of view are the Poeticus or Pheasant-eye varieties, the Burbidgei (which, though mainly of Poeticus blood, have a very slight infusion of Daffodil blood in them), and the Jonquils. Most of them are very hardy and vigorous. The Tazetta (or Polyanthus Narcissus varieties, not being thoroughly hardy, are better treated as a separate subject; and I have also passed over the rare and botanically interesting kinds of this group which do not lend themselves to ordinary garden cultivation.

Throughout this paper the whole family will be spoken of as Narcissi; the Magni-coronati group as Daffodils; the Medii-coronati as Star Narcissi; the Parvi-coronati as true Narcissi.

*As to Soil and Situation.*—The greater number of varieties will do very fairly well in almost any kind of garden soil, but even the most accommodating kinds will of course produce their best results when grown in the most suitable surroundings. It is often stated that the Narcissus does best in strong soil. But such a statement is misleading when made without modification. Let me tell you my own experience, reaching over a good many years, with a large and representative collection. I began growing Narcissi in a garden of very good but decidedly strong loam, and inclined to be wet in winter. The soil was rather shallow, varying from 11 to 14 inches in depth and resting on a sub-soil of strong clay. I got exceptionally fine flowers, but many of the plants "went off," and I found on lifting a large number of bulbs affected with basal rot. I was told I must expect heavy losses of this kind in Narcissus growing, but I thought the percentage too high. I accordingly made a number of deep well-drained beds and mixed a lot of lighter soil with the natural soil of the garden, and worked in a supply of "stick-ashes" before planting. In these beds I planted delicate and doubtful kinds and the more expensive bulbs of vigorous kinds, and put the white Daffodils and some other very delicate kinds in maiden loam of a rather light and gritty character. The result has been delightful, and for years past my Narcissi have not only given me excellent flowers (not quite so large perhaps in some cases, as in the heavy soil, but still very excellent and year by year maintaining their excellence), but also an unusually small proportion of unhealthy bulbs. So I recommend a not too heavy loam—a well-drained soil of medium consistency with a certain character of

grittiness—as the best all round soil for Narcissi. The particular constitutions, however, of the different classes should be considered as much as possible. The Poeticus and Burbidgei varieties, with the strongest kinds of Star Narcissi and a few of the stronger Daffodils, produce their best results in good strong moist loam, the more delicate varieties in a medium soil inclining to light. The White Daffodils, most beautiful of all the Narcissi and among the most uncertain, with some of the more uncertain kinds of self-yellow Daffodils (especially those of Spurius blood), do best in maiden turfy loam, and soon become diseased in soil that has much humus in it.

*As to Situation and Position.*—Of course it is delightful in spring to see the bright cheery flowers of the Narcissus in large irregularly shaped masses in the hardy flower borders, and cheap bulbs of strong, good, kinds may well be planted in such a position. But the better kinds deserve to be grown in a place to themselves, where they can be properly studied and attended to. But beds given up to them in the front garden will be untidy while the leaves are dying off, and empty during the summer and autumn. It is a good plan, therefore, to assign to the Narcissi some portions of ground in suitable parts of the kitchen garden. And if, as time goes on, the “yellow fever” should increase, and an inclination should develop itself to annex more and still more of the kitchen garden, so that the growth of vegetables is somewhat curtailed, encourage yourself by the reflection that good Narcissus bulbs are a better investment than Potatos, and that good vegetables are much cheaper to buy than good Narcissus flowers. Long rectangular beds are the most convenient, made four feet wide, so that it is easy to reach to the middle from either side without setting foot upon them. I enclose mine with wood edging boards which have been well tarred. This not only prevents the edges of the bed getting trampled upon, but makes it easy to raise the level a few inches above the surrounding surface, which is a very beneficial arrangement in gardens inclined to be wet.

The more vigorous varieties will do well with almost any aspect which is not absolutely sunless; most Narcissi, however, prefer a fair amount of sunshine, but to be partially shaded from the midday sun. A very good position is on the north side of a row of Apple trees. The White Daffodils are particularly grateful for the shade of trees; and these varieties, I find, do much better when planted near to (but not immediately under) a hedge or shrubs. They then have to maintain a contest with the fibrous roots of their encroaching neighbour, and their health is best when they have to fight for their living.

Wherever your beds may be placed let the ground be deeply dug (I prefer it double trenched), and well drained, if there is not good natural drainage. But the digging should be done long enough before planting time to let the soil settle, for the Narcissus does not like to be planted in loose soil. If for any reason you are obliged to prepare your beds in summer, shortly before planting time it is a good and simple plan to take some opportunity when the soil is not wet and press them down firmly by placing a fairly wide board on the surface and standing upon it. This very primitive method gives an even and not too great pressure, and will relieve you from the necessity of planting in too loose soil.

Though the *Narcissus* likes plenty of moisture when it is in vigorous growth it likes that moisture to pass through, and not remain stagnant in the soil; and the bulbs of most of the varieties strongly resent being water-logged; in fact they soon get diseased under such a condition. I find, indeed, that those bulbs which are in deeply dug beds do better both in dry and in wet seasons than those planted in shallow soil. A good deal must, of course, depend on the nature of the subsoil, but as a general rule deep digging and good drainage are necessary to permanent success.

*As to Planting.*—Having chosen and prepared your ground, planting must next be attended to. Now there is a rooted conviction in the minds of some old-fashioned gardeners that Guy Fawkes' Day is about the proper time for planting *Narcissus* bulbs. But this is two or three months too late if you wish to secure the best results. Of course November-planted bulbs will produce flowers; you may get flowers of a kind—even from bulbs planted in January. I have done so myself. But to get the most vigorous plants, the most perfect flowers, the greatest possible increase of bulbs, you must plant early. If you look at *Narcissus* bulbs in August you will see (and you will often see it quite early in August) a ring-like swelling all round the base of the bulb. This is caused by the effort of the young roots to start into growth, and it is Nature's warning to you to plant the bulbs as soon as you can if you do not wish them to lose in vigour. This early planting, so good for all, is even more necessary for some kinds than for others. The *Poeticus* varieties need planting first, for they have no period of rest; then the *Burbidgei*; then, as a rule, the *Star Narcissi*; then, with some exceptions, the *Daffodils*; in fact a good general rule seems to be that the more *Poeticus* blood there is in the bulbs the sooner they need planting. There are, however, as I said, a few exceptions, *e.g.*, the *Tenby Daffodil*, and *Maximus*, and the *Spurius* varieties (including the popular 'Henry Irving' and 'Golden Spur') are much better for being planted among the earliest, and some kinds, like *Bicolor 'Horsfield'*, show, by the tendency of their bulbs to shrink and get very dry soon when kept out of the ground, that they should be early replanted. I always try to get my *Poeticus* varieties in the ground by the end of July, and the whole stock by the end of August. Early planting is, I cannot doubt, essential if the best results are to be secured.

A change of soil and locality is highly beneficial to the *Narcissus*; but as few people are fortunate enough to have two gardens in different localities, you must do the best you can by changing your *Narcissus* beds from one part of the garden to another, and by digging in here and there soil of a different character, and by growing *Daffodils* where the other sorts of *Narcissi* have previously stood, and *vice versa*.

I plant the bulbs in rows north and south, the rows being a foot apart, and the bulbs planted from three to six inches from each other in the rows, according to size (and even a little farther apart in the case of exceptionally large bulbs, such as 'Emperor' and 'Sir Watkin'). This gives them ample room to stand for two, or even three, years before lifting again. You may plant closer if you are short of room, but the extra space given will well repay you in results. The plants are much

benefited by having plenty of air and light, and the foot space between the rows makes it easy to keep the ground open with a small hoe; a very beneficial operation, both in autumn and again when the plants are coming through the ground in spring. Here, again, the white Daffodils require rather exceptional treatment; they do best planted very closely in their rows, in fact, almost touching one another.

The depth at which a Narcissus bulb should be planted varies according to its size and according to the nature of the soil. The depth of soil above the neck of the bulb—the neck is that part near the top where the bulb begins to swell out into its ovoid form—should be  $1\frac{1}{2}$  times the depth of the bulb itself. This gives an average covering of from two to three inches of soil; but in very heavy soils the depth of planting should be a little less.

In the case of the glorious but somewhat uncertain Daffodil 'Maximus' I find deep planting answers best. I get more and finer flowers now than when I used to plant it at the usual depth.

Plant your bulbs, if possible, when the soil is nicely damp (not wet), and in planting be careful to settle the base of the bulb firmly in the soil, so that no air space is left under it. As my garden is inclined to be wet I generally, when bulbs are planted in fairly strong soil, put a little coarse silver sand both under and over the choicer kinds, and I do so with delicate kinds, even in the lighter soil. This proves very beneficial in wet seasons, and I have not noticed any disadvantage from it even in the driest season. There are, I know, some authorities who discourage this practice; but circumstances of soil alter cases, and experience only can teach what is most suitable in each case.

After planting the bulbs should in general be left undisturbed for two seasons. Varieties which increase slowly may, if they seem quite happy, be left for three years; and, on the other hand, delicate sorts which look as if they were not doing well may, with advantage, be lifted year by year. But I think that in some cases one hears of the constitution even of strong varieties has been injured by too frequent lifting and too greedy subdivision of the bulbs.

*As to Nourishment.*—Narcissus growers have had some trouble and differences of opinion in deciding how they may best supply their bulbs with the necessary nourishment. One rule now seems to be pretty generally admitted. No stable manure should be dug into the ground for some considerable time before planting. Even the most vigorous varieties do not like such manure to be in contact with their bulbs and roots. There is, however, an exception. The stronger kinds may be planted with advantage in ground from which early Potatoes (or such like crops) have been taken, for in this case the rawness and much of the strength of the manure have departed before the bulbs have anything to do with it. I find no better plan for the renovation of my Narcissus beds than to dig in a plentiful supply of well rotted turfy soil (when such is obtainable), particularly that of a dark yellow or red-brown colour, with iron in it, after having taken out an equivalent of the old soil, and "stick-ashes" are very valuable thoroughly mixed with the soil before planting. When it is necessary to apply manure, basic slag and crushed bones seem to be the most reliable. These in the

opinion of some experts may be mixed with the soil and placed next the bulbs at planting time. My own practice has been to apply them as a top dressing soon after planting, mixing them in with a hand fork in the covering of soil above the bulbs but not in immediate contact with them. Half a pound of basic slag or  $1\frac{1}{2}$  ounce of bone meal to each square yard is probably the best prescription. It will be useful to remember with regard to manure and strong loam that the more Poeticus blood there is in any variety the better will it enjoy strength both of food and soil.

*As to Lifting.*—After one, two, or three years, as the case may be, the bulbs must be taken up and the offsets they have produced separated from them; and it is even more important to be right in the time of lifting than in the time of planting. It is, I believe, to errors in lifting that we may trace many of the failures or half-successes which are sometimes complained of in the cultivation of Narcissi. The rule laid down for me years ago by an expert grower was this—in the matter of lifting *better be too early than too late*. My own experience has amply borne out this rule. Some of the varieties have no period of bulb rest: *i.e.* they begin to put out the roots for their new season's growth before the old season's foliage has begun to die away. This is especially the case with the Poeticus varieties—but it is not confined to them—and those varieties which do rest rest only for a short time. Now, if the bulbs be lifted after new rootlets have been put forth, these new roots, unless the bulbs be immediately replanted, must die off, and the vigour of the bulb will be diminished. In the case of delicate sorts, or where much new growth has taken place, the consequences may be most serious, the constitution of the bulb permanently injured. There is a great temptation to leave the bulbs in the ground until the foliage has quite died down, for they are much more easy to handle when taken up late in this way. But stick to the rule “better too early than too late.” If you should take up the bulb a little too early no real harm is done: the flower may be a little smaller the following year, but the bulb will be healthy; but if you are too late the consequences may be disastrous.

Only experience and experiment can teach how soon fresh root growth is to be expected in any particular variety. But the Poeticus varieties, Maximus and Odorus require to be lifted before they show any sign of fading foliage. Most of the other sorts I lift, and I think it is a safe rule, as soon as possible after the fading of the leaves has decidedly set in. Even doing this, and working hard at it, I always find before I can get my whole stock lifted that some of the varieties have begun to make fresh growth.

When the bulbs are lifted the offsets of the commoner sorts may generally be separated by carefully pulling apart; but this is too rough-and-ready a plan for dividing the less forward offsets of the more valuable kinds. In the case of these any small portion of the base which still connects the offsets with the mother-bulb should be cut through with a sharp knife; and it is better not to separate any bulbs where there is danger of cutting any part of the bulb except the base.

If the sun is shining when the bulbs are being lifted I place them at once under shade, as I cannot but think that the sudden change into hot

sunshine is calculated to act very injuriously upon the bulb. I should like to know the opinion of others on this point. But the objection of inconvenience does not seem to justify carelessness in this matter if, as I believe, the bulbs may suffer injury by such carelessness. The bulbs after being lifted should be spread out to dry in some cool airy place; and in storing them away after drying until replanting begins I always keep mine spread out in shallow trays, not heaped up one upon another. Trouble and labour expended on such details will bring their own reward in the general excellence of your stock.

*As to Enemies and Diseases.*—The Narcissus grower has not many enemies or plant diseases to contend with. Mice and birds leave the bulbs and flowers severely alone on account of their poisonous character. The *Narcissus fly* is a deadly pest in some countries, but, I believe, does comparatively little injury in most parts of England. My Lincolnshire garden is entirely free from it: it cannot stand our cold winters. *Black canker*, which occasionally shows itself in the leaves, need not, so far as my experience goes, cause anxiety: it has not done me any serious injury even among the few kinds in which it has occasionally appeared. *Basal rot* is the chief cause of loss, but where the general health of the stock is kept good by adhering to sound rules of cultivation the percentage of loss, except in the case of a few delicate varieties, is not great.

*As to forming a Collection.*—It is by no means an easy task out of the almost endless varieties now in cultivation to make a good selection, and the beginner certainly needs guidance.

(1) Regard should be had to the relative time of flowering of the different kinds, so as to secure a long flowering season; (2) the collection should be representative of all the more beautiful classes; (3) where several varieties which flower together are rather similar the inferior should be dispensed with; (4) a first-rate collection should have a considerable proportion of the beautiful white and sulphur Daffodils, and of the white *Leedsii* Narcissi, and also a good number of the red-cupped varieties. All this cannot be effected at once without considerable expense and without considerable knowledge. But with well chosen lists to select from it may be accomplished gradually, and the expense kept within reasonable limits.

It is a great but very common mistake to spend money in buying poor varieties because they are cheap. Good things take no more space and give, as a rule, no more trouble than poor ones; and with the Narcissus, as with most other things, "the best are the cheapest" in the long run. And although many of the best are costly, some most excellent kinds may be bought at a very reasonable price. I would suggest that about half the initial outlay should be invested in varieties which are both cheap and, at the same time, of high quality: these will at once give a good supply of fine flowers, the other half to be spent in a smaller number of the more expensive kinds. These latter will gradually increase and build up a fine collection. Begin chiefly with the vigorous sorts, and as you gain experience in cultivation add the more delicate and uncertain varieties.

With a view to assisting beginners in this process, I have prepared five short lists which contain among them under different heads most of

the best varieties at present in commerce. They are the pick of my own collection, which is a large and representative one. Lists A, B, and C contain kinds which are easily grown, and they are progressive in the matter of expense; list D contains very beautiful kinds indispensable to a fine collection, but of delicate or uncertain constitution. List E is made up of a few very expensive but exceedingly fine varieties which being all of tried and first-rate constitution are really a good investment. Numbers from 1 to 6 are added in brackets after each name to show roughly the relative time of flowering. I think they will be found fairly correct and a useful guide.

#### THE FIVE LISTS.

A.—Twenty-five cheap and very good sorts of which only the first is of at all uncertain constitution.

#### DAFFODILS.—

*Golden Spur*.—A large flower of deep rich self yellow and beautiful form, very early; of rather uncertain constitution; should be grown without manure in fibrous maiden loam (1).

*Emperor*.—A large stately flower of light yellow colour (3).

*P. R. Barr*.—Very similar to 'Emperor,' but later; is smaller and has a flower of more refined form (4).

*Bicolor Princeps*.—One of the earliest bicolors; very useful. It also does remarkably well in a cold frame (1).

*Bicolor Horsfield* or *Bicolor Empress*.—These are very similar. I prefer 'Horsfield.' It is about a week earlier than 'Empress,' and is rather more graceful in form, but the flower of 'Empress' has more substance and lasts rather longer (2).

*Bicolor Grandee*.—Flowers in succession to 'Horsfield' and 'Empress,' to which it is similar; late and very fine (5).

*W. P. Miner*.—A dwarf, sulphur-coloured Daffodil changing to white; valuable both for its elegance and its good constitution (3).

#### STAR NARCISSI—

*Incomparabilis Queen Bess*.—The earliest of the Star Narcissi (1).

*Incomparabilis Sir Watkin*.—A gigantic light yellow flower; a little coarse in form, but very showy, and invaluable for decorative purposes (2).

*Incomparabilis Cynosure*.—White, with red-stained cup, or *Incomp. Cynther*, yellow, with orange-stained cup (3).

*Incomparabilis Autocrat* and *Incomparabilis Frank Miles*.—Two remarkably fine forms of self-yellow Incomparables, quite distinct from each other (3).

*Incomparabilis King of the Netherlands*.—A strong-growing, showy, rather late flower (1).

*Barrii Orphée*.—The earliest of the beautiful Barri section (3).

*Barrii Conspicuous*.—A lovely pale yellow flower with crimson-edged cup; probably the most useful of all the Narcissi, regard being had to its beauty, good constitution, and rapid increase (4).

*Leedsii Minnie Hume*.—A most lovely white flower; the lemon-coloured cup changes gradually to pure white (3).

*Odorus Rugulosus*.—Has small very rich yellow flowers (several on a stem) and rush-like foliage. Better than *Odorus* 'Campernelle' (2).

#### TRUE NARCISSI—

*Burbidgei John Bain*.—The earliest of the *Burbidgei* varieties; a handsome flower (3).

*Burbidgei Ellen Barr*.—A very lovely and well-formed flower, with orange-stained crown (3).

*Burbidgei Falstaff*.—Another very beautiful and not very dissimilar flower (3).

*Burbidgei Vanessa*.—Rather late; of a striking shade of pale yellow and perfect shape (4).

*Poeticus Ornatus*.—An early and very fine form of the Pheasant's-eye class (4).

*Poeticus Poctarum*.—A little later than 'Ornatus,' and with the red in the crown more widely diffused (5).

*Poeticus of Gardens*.—The beautiful late flowering 'Pheasant's-eye' (6).

*Double Poeticus*.—With pure white *Gardenia*-flowered blossoms; very late; requires a moist situation and rather strong loam (6).

B. Seventeen rather more expensive varieties, very fine.

#### DAFFODILS—

*Minor*.—A very early, small, and most refined, self-yellow Daffodil; to be seen at its best should be grown in a cold frame (1).

#### STAR NARCISSI

*Incomparabilis C. J. Backhouse*.—Yellow, with a very striking red cup. There seem to be two "strains" of this variety, one of which is much better than the other (3).

*Incomp. Splendens*.—Sulphur, with large red-edged cup (3).

*Incomp. Princess Mary of Cambridge*.—A most refined and distinct flower, with orange-stained, widely expanded cup (3).

*Incomp. Beauty*.—Well named; sulphur-yellow with organ-scarlet margin to cup (3).

*Incomp. Semi-partitus*.—Of a soft primrose shade, very charming and distinct in form and colour (4).

*Barrii Maurice Vilmorin*.—Creamy white with long cup heavily stained orange-scarlet; dwarf, lovely (3).

*Barrii Flora Wilson*.—White with bright red edge to cup; very pretty (4).

*Leedsii Grand Duchess*.—One of the earliest of the *Leedsii* class; white with orange-stained cup (3).

*Leedsii Madge Matthew*.—A very elegant white flower, rather early (3).

*Leedsii Beatrice*.—Pure white of very elegant form (4).

*Leedsii Mrs. Langtry*.—White with bright canary edge to cup (4).

*Leedsii Mary Magdalen de Graaff*.—A beautiful form with very striking and distinct red colouring in cup. Is usually two-flowered (4).



*Nelsoni Mrs. Backhouse*.—A more finely shaped and more lasting flower than the better known 'Nelsoni Major' (4).

#### TRUE NARCISSI—

*Poeticus præcox grandiflorus*.—Rather earlier than 'Ornatus,' and quite distinct (4).

*Burbidgei Baroness Heath*.—Very distinct; yellow, with orange-scarlet cup (3).

*Burbidgei Model*.—Of very fine form; white, with orange-stained cup (4).

C.—Fourteen still more expensive varieties—most excellent.

#### DAFFODILS—

*Bicolor Mrs. Walter Ware*.—About the finest in form of all the Bicolors (3).

*Bicolor Victoria*.—A particularly free and vigorous grower; exceptionally good under glass (3). (Fig. 2.)

*Bicolor J. B. M. Camm*.—Very beautiful; the pale lemon trumpet changes gradually to white (3).

#### STAR NARCISSI—

*Incomparabilis Queen Sophia*.—The fine orange-red cup gives a beautiful and very distinct appearance (3).

*Incomp. Lulworth*.—One of the very finest Star Narcissi. The contrast between the pure white perianth and exceptionally vivid red cup is most fascinating (1).

*Incomp. Mabel Cowan*. Fine, rather late, with red margined cup (1).

*Barrii Crown Prince*.—One of the very best; late-flowering, white with red-stained cup (1).

*Barrii Mrs. Bowley*.—White with striking red cup; distinct and beautiful (4).

*Leedsii Gem*.—An elegant, drooping, white flower; very distinct (3).

*Leedsii Duchess of Westminster*. One of the very best; the canary, orange-edged cup passes off pure white (4).

*Leedsii Katherine Spurrell*. Another of the very best; with broad, overlapping perianth; striking dark green eye to the cup (4).

*Nelsoni Aurantius*.—By far the finest of the Nelsoni group, even though in some seasons the characteristic orange of the cup is absent (1).

#### TRUE NARCISSI—

*Burbidgei Princess Louise*.—The orange-red of the cup passes off apricot, giving a very lovely appearance (4).

*Burbidgei Beatrice Heselstine*.—The latest and best of the Burbidgei group; most valuable for its fine form and beautiful red-edged cup as well as for its lateness (5).

D.—Eighteen very fine varieties, necessary to a first-rate collection, which are more or less delicate, or require special treatment. Most of them do best in gritty maiden loam.

#### DAFFODILS —

*Henry Irving*.—A large self-yellow, with wheel-like perianth. One of the very earliest; should be grown in fibrous maiden loam without manure (1).

*Obvallaris* (The Tenby Daffodil).—Very early, distinct and fine; medium-sized, self-yellow. Especially good in a cold frame (1).

*Maximus*.—Deep-golden self-yellow; the most elegant in form and richest in colour of all the Daffodils (2). Prefers deep planting.

*Johnstoni Queen of Spain* (with straight trumpet), or *King of Spain* (with trumpet spreading at mouth).—Light self-yellow, with reflexed perianth, very distinct and among the most beautiful; are best in a cold frame (3).

*Captain Nelson*.—A very large handsome yellow Daffodil with very fine trumpet (3).

*John Nelson*.—Another fine distinct, rather late-flowering yellow Daffodil (3).

*Mrs. Thompson*.—An early white Daffodil (the pale lemon trumpet passes off white); has a less uncertain constitution than many others of the same class (2).

*Cernuus* (1), or *Tortuosus* (2).—Very elegant white Daffodils. The former is rather earlier, and perhaps more elegant.

*Albicans*.—Less delicate than most of the white Daffodils (2).

*Cernuus pulcher*.—A very distinct white Daffodil with twisted, drooping perianth segments; of a good constitution (2).

*Mrs. Budge*.—A very fine white Daffodil, one of the best (2).

*Mrs. Camm*.—This and the following variety are, when well grown, probably the most elegant of the white Daffodils; late flowering (4).

*Mrs. Vincent*.—A very distinct and perfect white flower; late (4).

#### STAR NARCISSI —

Double *Incomparabilis Sulphur Phoenix* ('Codlings and 'ream').—White and sulphur mingled; the most beautiful of the double *Incomparables* (4).

*Triandrus albus* ('Angel's Tears').—An elegant white drooping flower with reflexed perianth; is best grown in pans in a cold frame (3).

*Juncifolius*.—The smallest *Narcissus*; rush-leaved, with pretty little yellow flowers; is best grown in pans in a cold frame (4).

#### TRUE NARCISSI —

*Tenuior*.—The slender, straw-coloured *Narcissus*; has several flowers on a stem; very elegant; is best grown in a cold frame (4).

*Intermedius Bifrons Sunset*.—A very beautiful small *Tazetta*, which in most seasons does well in the border, and is always excellent in a cold frame; canary-yellow, with glowing orange-red cup (4).

E.—Six very expensive varieties of very great merit and thoroughly good in constitution.

#### DAFFODILS—

*Glory of Leiden*.—Is best described as a huge 'Emperor,' but is more refined in form; a splendid flower of great substance when well grown and from a good stock. The cut flowers last a very long time (3).

*Bicolor Madame Plémp*.—Resembles a huge 'Horsfield'; a very good doer (3).

*Madame de Graaff*.—One of the largest, finest, and most distinct white Daffodils; has substance and constitution as strong as a Bicolor. The trumpet, pale lemon at first, changes to a beautiful waxy white (4).

*Weardale Perfection*.—The largest and most dignified Bicolor, but so high in price at present as only to be within the reach of a few growers (4).

#### STAR NARCISSI—

*Incomparabilis Gloria Mundi*.—One of the very best. In good seasons the dusky red of the cup contrasts finely with the yellow perianth. In some seasons, however, the red colouring comes too pale, and the flower a little coarse (4).

*Barrii Dorothy Wemyss*.—The latest and, perhaps, the most beautiful of the Barrii section; has a broader perianth than Barrii 'Crown Prince' (5).

CULTIVATION IN COLD FRAMES.—With careful cultivation even finer flowers of some of the varieties may be obtained from bulbs grown in boxes and pots in well protected cold frames than will be generally produced by the same varieties outside; and there will be a little gain also in severe seasons in the earliness of flowering. I would advise those who have cold frame accommodation to grow a few bulbs, especially of the following varieties:—*Tenby*, *Henry Irving*, *Pallidus precox*, *Albicans*, *Princeps*, *Johnstoni* *Queen of Spain*, *Victoria*, *Emperor*, *Queen Bess*, *Sir Watkin*, *Barrii conspicuus*, *Ornatus*, *Tenuior*, *Intermedius* *Sunset* (all these in boxes). Also the small growing kinds:—*Triandrus albus*, *Juncifolius*, and *Minor* (in pots and pans). Others, of course, may be added, but these are a few kinds I find especially useful and good grown in this way.

The results will depend on the attention which is given to details, and I venture to give some advice for those who have not as yet had experience in this kind of plant growing. For the deeper rooting kinds you can get strong wooden boxes from your grocer, about 7 inches deep by 8 inches wide and 20 inches long. Make holes for drainage in the bottom. Put some lumps of charcoal at the bottom and cover them with some half-rotten turf and fill with a mixture of good fibrous loam and good sandy and gritty soil, and a little stick-ashes, and in the boxes in which you intend to plant any strong-growing sorts (but not where delicate sorts are to grow) mix in a little artificial manure, or a little very old and rotten cow-manure, so old as to have become almost like soil. Plant the bulbs as early as possible in August, not too thickly, but about 2 or 3 inches apart each way (the very small bulbs closer), and only just buried in the soil. Then pack all the boxes and pots side by side in some open space (on level

ground) on an even foundation of ashes. Take care they stand quite level, and cover them with about 5 or 6 inches of cocoa fibre refuse, except such small growing kinds as *Triandrus*, *Juncifolius*, and *Minor*, which only need about 3 inches. Leave them outside till about the middle or end of November; the boxes will then be full of roots, and some of the varieties will have made growth upwards. Remove them from under the cocoa fibre and place in the cold frame, again letting them rest on a few inches of ashes, and taking care that they stand quite level. Let any tender young growth which is now exposed be shaded from strong light for a few days, until the white shoots turn green; then admit full light. A space should be left between the boxes or pots and the sides of the frames, and this and any spaces between the boxes and pots themselves should be filled in with cocoa fibre; and about  $\frac{1}{4}$  to  $\frac{1}{2}$  inch of this material may with advantage be strewn over the surface of the soil in the boxes and pots. Through the winter the frames should be well protected with mats at night and during severe frosty days, so as to secure early flowering. Plenty of air must be admitted, except in severe weather, for the plants must not be allowed to become drawn. A most important point is the watering which must be regularly given (except, of course, during frost) after the boxes, &c., are put in the cold frame. At first, all that is necessary is to keep the soil nicely moist; but it should be remembered that the boxes are full of roots. When the plants are making strong growth above ground they will need plenty of water in increasing supply until as flowering time approaches they get a good watering three times a week. In this way remarkably fine flowers may be obtained. Do not neglect watering after the flowers have been cut, or the bulbs will dwindle and become worthless, but give moderate supplies until the foliage shows signs of beginning to die down. I ascribe the fineness of the blooms obtained by this method to the regular supplies of water, coupled with perfect drainage.

GROWING IN GRASS.—Almost all the Narcissi look well and do well planted in grass, if you can spare them a corner of a lawn or meadow which can be left without mowing until the end of June. For the Narcissus leaves must not be cut, but left to die away naturally. Any of the delicate sorts, which you cannot induce to grow happily in cultivated beds, may be dibbled into the grass in holes, filled up with maiden loam, and left to themselves. The flowers will not be so large as in the border, and the bulbs will make very slow increase, but they will be more healthy and happy.

AS TO CUTTING THE FLOWERS.—If you want to get the most enjoyment possible from your Narcissus flowers, do not leave them to the mercy of wind, rain, sun, and dust. Cut them as soon as the perianth begins to unwrap itself from the crown, and let them open out in water in a fairly warm room, or other sheltered place. All the beauty and freshness of colour, which are so charming in the Narcissus, will thus be preserved.

The cut flowers never look so graceful as when arranged with their own foliage; but as it injures or destroys the bulbs to cut the leaves, you should grow patches of the common sorts, so as to have a supply of leaves to set off the flowers of the choicer kinds.

In conclusion, if these rules are thought to be either too simple or too lengthy, please put it down to over-anxiety on my part to make them thoroughly practical and helpful to beginners, and so forgive me. The cultivation of this flower is a great and increasing source of pleasure. Everyone who has a moderate-sized garden may grow it successfully, and may have throughout March and April, and the first part of May, a perfect feast of beauty among the varied forms of the Narcissus.



FIG. 3.—CYPRIPEDIUM ASHWORTHÆ. *Journal of Horticulture.*)

PROBLEMS OF HEREDITY AS A SUBJECT FOR  
HORTICULTURAL INVESTIGATION.

By Mr. W. BATESON, M.A., F.R.S., Fellow of St. John's College,  
Cambridge.

[May 8, 1900.]

AN exact determination of the laws of heredity will probably work more change in man's outlook on the world, and in his power over nature, than any other advance in natural knowledge that can be foreseen.

There is no doubt whatever that these laws can be determined. In comparison with the labour that has been needed for other great discoveries it is even likely that the necessary effort will be small. It is rather remarkable that while in other branches of physiology such great progress has of late been made, our knowledge of the phenomena of heredity has increased but little; though that these phenomena constitute the basis of all evolutionary science and the very central problem of natural history is admitted by all. Nor is this due to the special difficulty of such inquiries so much as to general neglect of the subject.

It is in the hope of inducing others to pursue these lines of investigation that I take the problems of heredity as the subject of this lecture to the Royal Horticultural Society.

No one has better opportunities of pursuing such work than horticulturists. They are daily witnesses of the phenomena of heredity. Their success depends also largely on a knowledge of its laws, and obviously every increase in that knowledge is of direct and special importance to them.

The want of systematic study of heredity is due chiefly to misapprehension. It is supposed that such work requires a lifetime. But though for adequate study of the complex phenomena of inheritance long periods of time must be necessary, yet in our present state of deep ignorance almost of the outline of the facts, observations carefully planned and faithfully carried out for even a few years may produce results of great value. In fact, by far the most appreciable and definite additions to our knowledge of these matters have been thus obtained.

There is besides some misapprehension as to the kind of knowledge which is especially wanted at this time, and as to the modes by which we may expect to obtain it. The present paper is written in the hope that it may in some degree help to clear the ground of these difficulties by a preliminary consideration of the question, How far have we got towards an exact knowledge of heredity, and how can we get further?

Now this is pre-eminently a subject in which we must distinguish what we *can* do from what we want to do. We *want* to know the whole truth of the matter; we want to know the physical basis, the inward and essential nature, "the causes," as they are sometimes called, of heredity. We want also to know the laws which the outward and visible phenomena obey.

Let us recognise from the outset that as to the essential nature of these phenomena we still know absolutely nothing. We have no glimmering of an idea as to what constitutes the essential process by which the likeness of the parent is transmitted to the offspring. We can study the processes of fertilisation and development in the finest detail which the microscope manifests to us, and we may fairly say that we have now a thorough grasp of the visible phenomena; but of the nature of the physical basis of heredity we have no conception at all. No one has yet any suggestion, working hypothesis, or mental picture that has thus far helped in the slightest degree to penetrate beyond what we see. The process is as utterly mysterious to us as a flash of lightning is to a savage. We do not know what is the essential agent in the transmission of parental characters, not even whether it is a material agent or not. Not only is our ignorance complete, but no one has the remotest idea how to set to work on that part of the problem. We are in the state in which the students of physical science were in the period when it was open to anyone to believe that heat was a material substance or not, as he chose.

But apart from any conception of the essential modes of transmission of characters, we can study the outward facts of the transmission. Here, if our knowledge is still very vague, we are at least beginning to see how we ought to go to work. Formerly naturalists were content with the collection of numbers of isolated instances of transmission—more especially, striking and peculiar cases—the sudden appearance of highly prepotent forms, and the like. We are now passing out of that stage. It is not that the interest of particular cases has in any way diminished—for such records will always have their value—but it has become likely that general expressions will be found capable of sufficiently wide application to be justly called “laws” of heredity. That this is so is due almost entirely to the work of Mr. F. Galton, to whom we are indebted for the first systematic attempt to enunciate such a law.

All laws of heredity so far propounded are of a statistical character and have been obtained by statistical methods. If we consider for a moment what is actually meant by a “law of heredity” we shall see at once why these investigations must follow statistical methods. For a “law” of heredity is simply an attempt to declare the course of heredity under given conditions. But if we attempt to predicate the course of heredity we have to deal with conditions and groups of causes wholly unknown to us, whose presence we cannot recognise, and whose magnitude we cannot estimate in any particular case. The course of heredity in particular cases therefore cannot be foreseen.

Of the many factors which determine the degree to which a given character shall be present in a given individual only one is known to us, namely, the degree to which that character is present in the parents. It is common knowledge that there is not that close correspondence between parent and offspring which would result were this factor the only one operating; but that, on the contrary, the resemblance between the two is only a general one.

In dealing with phenomena of this class the study of single instances reveals no regularity. It is only by collection of facts in great numbers,

and by statistical treatment of the mass, that any order or law can be perceived. In the case of a chemical reaction, for instance, by suitable means the conditions can be accurately reproduced, so that in every individual case we can predict with certainty that the same result will occur. But with heredity it is somewhat as it is in the case of the rain-fall. No one can say how much rain will fall to-morrow in a given place, but we can predict with moderate accuracy how much will fall next year, and for a period of years a prediction can be made which accords very closely with the truth.

Similar predictions can from statistical data be made as to the duration of life and a great variety of events the conditioning causes of which are very imperfectly understood. It is predictions of this kind that the study of heredity is beginning to make possible, and in that sense laws of heredity can be perceived.

We are as far as ever from knowing why some characters are transmitted, while others are not; nor can anyone yet foretell which individual parent will transmit characters to the offspring, and which will not; nevertheless the progress made is distinct.

As yet investigations of this kind have been made in only a few instances, the most notable being those of Galton on human stature, and on the transmission of colours in Basset hounds. In each of these cases he has shown that the expectation of inheritance is such that a simple arithmetical rule is approximately followed. The rule thus arrived at is that of the whole heritage of the offspring the two parents together on an average contribute one half, the four grandparents one quarter, the eight great-grandparents one eighth, and so on, the remainder being contributed by the remoter ancestors.

Such a law is obviously of practical importance. In any case to which it applies we ought thus to be able to predict the degree with which the purity of a strain may be increased by selection in each successive generation.

To take a perhaps impossibly crude example, if a seedling show any particular character which it is desired to fix, on the assumption that successive self-fertilisations are possible, according to Galton's law the expectation of purity should be in the first generation of self-fertilisation 1 in 2, in the second generation 3 in 4, in the third 7 in 8, and so on.

But already many cases are known to which the rule in the simple form will not apply. Galton points out that it takes no account of individual prepotencies. There are, besides, numerous cases in which on crossing two varieties the character of one variety is almost always transmitted to the first generation. Examples of these will be familiar to those who have experience in such matters. The offspring of the Polled Angus cow and the Shorthorn bull is almost invariably polled. Seedlings raised by crossing *Atropa belladonna* with the yellow-fruited variety have without exception the blackish-purple fruits of the type. In several hairy species when a cross with a glabrous variety is made, the first cross-bred generation is altogether hairy.

Still more numerous are examples in which the characters of one variety very largely, though not exclusively, predominate in the offspring.

These large classes of exceptions—to go no further—indicate that, as we might in any case expect, the principle is not of universal application, and will need various modifications if it is to be extended to more complex cases of inheritance of varietal characters. No more useful work can be imagined than a systematic determination of the precise “law of heredity” in numbers of particular cases.

Until lately the work which Galton accomplished stood almost alone in this field, but quite recently remarkable additions to our knowledge of these questions have been made. In the present year Professor de Vries published a brief account\* of experiments which he has for several years been carrying on, giving results of the highest value.

The description is very short, and there are several points as to which more precise information is necessary both as to details of procedure and as to statement of results.† Nevertheless it is impossible to doubt that the work as a whole constitutes a marked step forward, and the full publication which is promised will be awaited with great interest.

The work relates to the course of heredity in cases where definite varieties differing from each other in some *one* definite character are crossed together. The cases are all examples of discontinuous variation: that is to say, cases in which actual intermediates between the parent forms are not usually produced on crossing. It is shown that the subsequent posterity obtained by self-fertilising these cross-breds or hybrids break up into the original parent forms according to fixed numerical rule.

Professor de Vries begins by reference to a remarkable memoir by Gregor Mendel,‡ giving the results of his experiments in crossing varieties of *Pisum sativum*. These experiments of Mendel’s were carried out on a large scale, his account of them is excellent and complete, and the principles which he was able to deduce from them will certainly play a conspicuous part in all future discussions of evolutionary problems. It is not a little remarkable that Mendel’s work should have escaped notice, and been so long forgotten.

For the purposes of his experiments Mendel selected seven pairs of characters as follows:—

1. Shape of ripe seed, whether round, or angular and wrinkled.
2. Colour of “endosperm” (cotyledons), whether some shade of yellow, or a more or less intense green.
3. Colour of the seed-skin, whether various shades of grey and grey-brown, or white.
4. Shape of seed-pod, whether simply inflated, or deeply constricted between the seeds.
5. Colour of unripe pod, whether a shade of green, or bright yellow.
6. Shape of inflorescence, whether the flowers are arranged along on axis, or are terminal and more or less umbellate.
7. Length of peduncle, whether about 6 or 7 inches long, or about  $\frac{3}{4}$  to  $1\frac{1}{2}$  inch.

\* *Comptes Rendus*, March 26, 1900, and *Ber. d. Deutsch. Bot. Ges.*, xviii. 1900, p. 83.

† For example, I do not understand in what sense de Vries considers that Mendel’s law can be supposed to apply even to all “monohybrids,” for numerous cases are already known in which no such rule is obeyed.

‡ ‘Versuche üb. Pflanzenhybriden’ in the *Verh. d. Naturf. Ver. Brunn*, iv. 1865.

Large numbers of crosses were made between Peas differing in respect of each of these pairs of characters. It was found that in each case the offspring of the cross exhibited the character of one of the parents in almost undiminished intensity, and intermediates which could not be at once referred to one or other of the parental forms were not found.

In the case of each pair of characters there is thus one which in the first cross prevails to the exclusion of the other. This prevailing character Mendel calls the *dominant* character, the other being the *recessive* character.\*

That the existence of such "dominant" and "recessive" characters is a frequent phenomenon in cross-breeding, is well known to all who have attended to these subjects.

By self-fertilising the cross-breds Mendel next raised another generation. In this generation were individuals which showed the dominant character, but also individuals which preserved the recessive character. This fact also is known in a good many instances. But Mendel discovered that in this generation the numerical proportion of dominants to recessives is approximately constant, being in fact *as three to one*. With very considerable regularity these numbers were approached in the case of each of his pairs of characters.

There are thus in the first generation raised from the cross-breds 75 per cent. dominants and 25 per cent. recessives.

These plants were again self-fertilised, and the offspring of each plant separately sown. It next appeared that the offspring of the recessives *remained pure recessive*, and in subsequent generations never reverted to the dominant again.

But when the seeds obtained by self-fertilising the dominants were sown it was found that some of the dominants gave rise to pure dominants, while others had a mixed offspring, composed partly of recessives, partly of dominants. Here also it was found that the average numerical proportions were constant, those with pure dominant offspring being to those with mixed offspring as one to two. Hence it is seen that the 75 per cent. dominants really are not all alike, but consist of twenty-five which are pure dominants and fifty which are really cross-breds, though, like the cross-breds raised by crossing the two varieties, they only exhibit the dominant character.

To resume, then, it was found that by self-fertilising the original cross-breds the same proportion was always approached, namely—

25 dominants, 50 cross-breds, 25 recessives, or 1D : 2DR : 1R.

Like the pure recessives, the pure dominants are thenceforth pure, and only give rise to dominants in all succeeding generations.

On the contrary the fifty cross-breds, as stated above, have mixed offspring. But these, again, in their numerical proportions, follow the same law, namely, that there are three dominants to one recessive. The recessives are pure like those of the last generation, but the dominants can, by further self-fertilisation and cultivation of the seeds produced, be

\* Note that by these useful terms the complications involved by use of the expression "prepotent" are avoided.

shown to be made up of pure dominants and cross-breeds in the same proportion of one dominant to two cross-breeds.

The process of breaking up into the parent forms is thus continued in each successive generation, the same numerical law being followed so far as has yet been observed.

Mendel made further experiments with *Pisum sativum*, crossing pairs of varieties which differed from each other in two characters, and the results, though necessarily much more complex, showed that the law exhibited in the simpler case of pairs differing in respect of one character operated here also.

Professor de Vries has worked at the same problem in some dozen species belonging to several genera, using pairs of varieties characterised by a great number of characters: for instance, colour of flowers, stems, or fruits, hairiness, length of style, and so forth. He states that in all these cases Mendel's law is followed.

The numbers with which Mendel worked, though large, were not large enough to give really smooth results; but with a few rather marked exceptions the observations are remarkably consistent, and the approximation to the numbers demanded by the law is greatest in those cases where the largest numbers were used. When we consider, besides, that Tscherniak and Correns announce definite confirmation in the case of *Pisum*, and de Vries adds the evidence of his long series of observations on other species and orders, there can be no doubt that Mendel's law is a substantial reality; though whether some of the cases that depart most widely from it can be brought within the terms of the same principle or not, can only be decided by further experiments.

One may naturally ask, How can these results be brought into harmony with the facts of hybridisation as hitherto known; and, if all this is true, how is it that others who have so long studied the phenomena of hybridisation have not long ago perceived this law? The answer to this question is given by Mendel at some length, and it is, I think, satisfactory. He admits from the first that there are undoubtedly cases of hybrids and cross-breeds which maintain themselves pure and do not break up. Such examples are plainly outside the scope of his law. Next he points out, what to anyone who has rightly comprehended the nature of discontinuity in variation is well known, that the variations in each character must be *separately* regarded. In most experiments in crossing, forms are taken which differ from each other in a multitude of characters—some continuous, others discontinuous, some capable of blending with their contraries, while others are not. The observer on attempting to perceive any regularity is confused by the complications thus introduced. Mendel's law, as he fairly says, could only appear in such cases by the use of overwhelming numbers, which are beyond the possibilities of practical experiment.

Both these answers should be acceptable to those who have studied the facts of variation and have appreciated the nature of Species in the light of those facts. That different species should follow different laws, and that the same law should not apply to all characters alike, is exactly what we have every right to expect. It will also be remembered that the principle is only declared to apply to discontinuous characters. As

stated also it can only be true where reciprocal crossings lead to the same result. Moreover, it can only be tested when there is no sensible diminution in fertility on crossing.

Upon the appearance of de Vries' papers announcing the "rediscovery" and confirmation of Mendel's law and its extension to a great number of cases two other observers came forward and independently describe series of experiments fully confirming Mendel's work. Of these papers the first is that of Correns,\* who repeated Mendel's original experiment with Peas having seeds of different colours. The second is a long and very valuable memoir of Tschermak,† which gives an account of elaborate researches into the results of crossing a number of varieties of *Pisum sativum*. These experiments were in many cases carried out on a large scale, and prove the main fact enunciated by Mendel beyond any possibility of contradiction. Both Correns (in regard to Maize) and Tschermak in the case of *P. sativum* have obtained further proof that Mendel's law holds as well in the case of varieties differing from each other in two characters, one of each being dominant, though of course a more complicated expression is needed in such cases.‡

That we are in the presence of a new principle of the highest importance is, I think, manifest. To what further conclusions it may lead us cannot yet be foretold. But both Mendel and the authors who have followed him lay stress on one conclusion, which will at once suggest itself to anyone who reflects on the facts. For it will be seen that the results are such as we might expect if it is imagined that the cross-bred plant produced pollen grains and ovules, each of which bears only one of the alternative varietal characters and not both. If this were so, and if on the average the same number of pollen grains and ovules partook of each of the two characters, it is clear that on a random assortment of pollen grain and ovules Mendel's law would be obeyed. For 25 per cent. of "dominant" pollen grains would unite with 25 per cent. "dominant" ovules; 25 per cent. "recessive" pollen grains would similarly unite with 25 per cent. "recessive" ovules; while the remaining 50 per cent. of each kind would unite together. It is this consideration which leads both de Vries and Mendel to assert that these facts of crossing prove that each ovule and each pollen grain is pure in respect of each character to which the law applies. It is highly desirable that varieties differing in the form of their pollen should be made the subject of these experiments, for it is quite possible that in such a case strong confirmation of this deduction might be obtained.

As an objection to this deduction, however, it is to be noted that though true intermediates did not occur, yet the degrees in which the characters appeared did vary in degree, and it is not easy to see how the hypothesis of perfect purity in the reproductive cells can be supported in such cases. Be this, however, as it may, there is no doubt we are beginning to get new lights of a most valuable kind on the nature of

\* *Ber. deut. Bot. Ges.*, 1900, xviii. p. 158.

† *Zeitschr. f. d. landw. Versuchswesen in Oesterr.*, 1900, iii. p. 465.

‡ Tschermak's investigations were besides directed to a re-examination of the question of the absence of beneficial results on cross-fertilising *P. sativum*, a subject already much investigated by Darwin, and upon this matter also important further evidence is given in great detail.

heredity and the laws which it obeys. It is to be hoped that these indications will be at once followed up by independent workers. Enough has been said to show how necessary it is that the subjects of experiment should be chosen in such a way as to bring the laws of heredity to a real test. For this purpose the first essential is that the differentiating characters should be few, and that all avoidable complications should be got rid of. Each experiment should be reduced to its simplest possible limits. The results obtained by Galton, and also the new ones especially detailed in this paper, have each been reached by restricting the range of observation to one character or group of characters, and there is every hope that by similar treatment our knowledge of heredity may be rapidly extended.

[NOTE.— Since the above was printed further papers on Mendel's Law have appeared, namely, de Vries, *Rev. génér. Bot.*, 1900, p. 257; Correns, *Bot. Ztg.*, 1900, p. 229; and *Bot. Cblt.*, lxxiv., p. 97, containing new matter of importance. Prof. de Vries kindly writes to me that in asserting the general applicability of Mendel's Law to "monohybrids" (crosses between parents differing in respect of *one* character only), he intends to include cases of discontinuous varieties only, and he does not mean to refer to continuous varieties at all. October 31, 1900.]



FIG. 4.—*ONCIDIUM CRISPUM "GRANDIFLORUM"*. (*Journal of Horticulture*.)

## OBSERVATIONS ON SOME OF THE PLANTS EXHIBITED.

By the Rev. Professor GEORGE HENSLOW, M.A., V.M.H.

[June 5, 1900.]

ORCHIDS.—Mr. Henslow first described the process of fertilisation in *Orchis Morio*, exhibited by Mr. Wallace; and also that of *Phalenopsis grandiflora*. He called attention to some fine blossoms of *Cattleya labiata Warnerii*, sent by Mr. Jas. Douglas, to show that Orchids do not degenerate if properly treated; for the plant from which they were gathered was a portion of one exhibited by Mr. Rucker in 1866.

Mr. Henslow alluded to a paper by M. Noel Bernard\* upon the germination of Orchids, which has always been a matter of great difficulty. This has arisen from the fact that the seeds, which are always in an arrested pro-embryonic condition, will not germinate unless a particular microbe is in the soil, which is required for a symbiotic existence. M. Bernard states that little difficulty is met with if the seeds of any species be sown on the soil in which a plant of that species has been growing, as it is impregnated with the particular microbe required.

STREPTOCARPUS.—The original species, *S. polyanthus*, with small insignificant flowers, was shown for comparison with the resulting hybrids of much finer quality raised by Mr. Veitch.

*Ornithogalum arabicum*.—Five specimens were sent by Mr. Wallace. Mr. Henslow remarked that in Malta the Maltese are very careless in removing "weeds" from their fields, so that he had collected large quantities of this flower, as well as of *Gladiolus*, Blue Anemones, Pheasant's-eye, *Oxalis cernua*, &c., for decorative purposes, all being troublesome "weeds."

HELIANTHEMUM.—A plant of this genus afforded an illustration of rapid motion being exhibited by the stamens, for when lightly grasped and then let go they all spread out upon the petals.

PEONIA.—The only British species, *P. corallina*, which formerly grew on Steep Holmes, an island off the mouth of the Severn, was usually regarded as "introduced," but Mr. Henslow observed that as it is a Mediterranean plant it may possibly have belonged to the small group which passes from the Riviera to Normandy, and are thence found reduced in numbers in the Channel Islands, while a few occur in the South-west of England and up the West Coast. They thus became isolated when the English Channel was formed and severed England from the Continent.

EFFECT OF STOCK ON SCION.—Dr. Bonavia sent examples of flowering shoots of *Cytisus Adami*, and Mr. Henslow explained the well-known origin of the dissociation of *C. Laburnum* from *C. purpureus* on the same tree. As another influence of stock on scion he referred to Mr. Heal's experience in grafting certain hybrids of the greenhouse Rhododendrons

\* *Revue Générale de Botanique*, March 1900.

at Mr. Veitch's establishment, in that when an orange-coloured flowering variety was grafted on a pink-flowering stock the orange colour becomes more or less modified by the infusion of pink.

*Calochortus pulchellus*.—Mr. Wallace sent a flowering specimen of the original form discovered by Douglas in California. The usual one known in gardens is a variety with considerably smaller flowers. Both were exhibited for comparison.

ALPINE PLANTS.—A collection of these was exhibited to show the brilliancy on the colouring of the flowers. Mr. Henslow pointed out that this characteristic feature was not altogether due to the action of light directly upon the flowers themselves, but it enhanced the character of the foliage, and this was the means of making the flowers.

EREMURUS.—A remarkably fine collection of tall spikes of this plant was exhibited by Mr. Veitch. They were grown on the site of an old cottage garden, but with no special treatment.

RHODODENDRON 'ARBOREUM' TYPE. —Mr. Paul had an interesting hybrid with brilliant crimson flowers, but rather small in size, somewhat resembling those of the true *R. arboreum* of India. This latter is not hardy, but the hybrid shown had the advantage of being perfectly hardy, and would doubtless be an acquisition to our shrubberies.



FIG. 5. —*ODONTOGLOSSUM CRISPUM* 'FRANZ MAZARELL.' (*Journal of Horticulture*.)

## AQUATIC PLANTS.

By Prof. G. S. BOULGER, F.L.S., F.G.S., Professor of Botany,  
City of London College.

[Read June 19, 1900.]

GARDENERS group plants primarily according to their requirements as to heat, protection from frost, and moisture. They can, for the purposes of this grouping, pay little heed to those structural characters which determine the classifications of the systematic botanist. If he have an Orchid-house, the gardener cultivates in it only the more tropical and mostly epiphytic members of the order, not the terrestrial species of our own climate; whilst on his rock-garden he will assemble members of many different Natural Orders, natives of many widely distant mountains. He is, in short, primarily a practical physiologist rather than a student of anatomy.

The botanist, on the other hand, when he finds classification of some sort thrust upon him, if only as a practical necessity arising from the immense multitude of plants now known to science and the limited powers of his own memory, might seem at first free to choose the basis of his grouping. In early times mere size, the distinction between herbs, trees, and shrubs, medicinal properties, or other physiological characteristics, such as whether plants lived as parasites or grew in the water, suggested themselves. It was, however, recognised that, on merely *a priori* grounds of abstract logic, it was desirable to discover the closest resemblances between plants, and that this was only to be done by taking into account the totality of their characters. One set of characters might furnish a convenient index, such as the "artificial" system of Linnaeus; but whilst resemblance in a few points indicated a distant affinity, it was recognised that resemblances in more points suggested a closer alliance, so that a consideration of the aggregate of characters might yield a "natural" system. Whilst botanists, as far back as the time of Magnol in the seventeenth century, spoke of the "affinities" of plants, and the instinct of genius in Bernard de Jussieu had sketched out with great completeness a natural system of classification for flowering plants before 1760, it was Darwin who first showed that affinity meant relationship.

The ideal at which the botanist aims in his classification is, then, the reconstruction of the pedigree of the vegetable kingdom. Characters possessed in common by large numbers of plants would seem to be derived from a remote common ancestor, and are suitable to distinguish large groups in our classification. Thus the modified bud which we term a *flower* and the yet more distinctive structure known as a *seed* characterise the highest, and one of the largest, of the primary divisions of the plant world; the enclosure of the seed in an ovary and its fertilisation by means of pollen falling upon a viscid surface or *stigma* serve to mark off the higher division of the Spermaphyta, which we term *Angiosperms*, from the lower or *Gymnospermia*; and the number of *cotyledons*, or

seed-leaves, in the embryo serves to divide the Angiosperms into the two classes, *Dicotyledones* and *Monocotyledones*.

It is true indeed— as is well seen in the division last mentioned— that the character which gives a name to a group is associated with various other *differentiæ* by what is termed correlation. Thus we find that *Dicotyledons* not only have generally the floral leaves in whorls of five, as against the threes among *Monocotyledons*, but have also generally a tap-root and not-veined leaves, as against the tufted fibrous roots and parallel venation of the other class. These characters, however, are perhaps more subject to exceptions than those from which the classes are named; and when we proceed to the subdivision of these classes we again find that botanists have had to adopt characters derived from the floral organs, such as the presence or absence of cohesion between the petals. These, then, are the characters derived from the more remote common ancestors of flowering plants; whilst we find, on the other hand, that the *vegetative* structures, those concerned directly with the nutrition of the individual, such as the forms of leaf and stem, are only distinctive of smaller groups, *i.e.* have been more recently acquired, and are more liable to modification by the plant's surroundings. When we take a comprehensive survey of those physiological groups of the cultivator to which I have alluded, such as alpine plants, succulent plants, or aquatic plants, it is precisely in these vegetative organs that we find they most agree. We thus arrive at the principle of classification that “the less any part of the plant is concerned with special habits the more important is it for classification”; whilst all the characters of a species may be divided into those that are inherited—mostly ordinal or generic—and those that are adaptations to its environment.

The chief interest which aquatic plants possess for the scientific botanist arises from the fact that closely similar conditions of life acting on plants of the most varied ancestry have produced such remarkable resemblances in the general habit, or form and even structure of the vegetative organs, as to enable us readily to separate the adaptational from the more remotely inherited characters. Though belonging to many orders widely divergent in their affinities, as indicated by their reproductive organs, aquatic plants form, in fact, a *biological group*, and the study of their adaptation to their mode of life will serve (i.) to show that merely physiological characters are no guide to affinity, and (ii.) to illustrate (a) the action of the environment on the organism, (b) the inheritance of acquired characters, and (c) the varied adaptations of structures differing in origin to serve the same functions.

If we consider the nature of water as an environment or conditioning influence upon plant life, we shall the better appreciate the manifold adaptations of a most varied assortment of plants to life in such a medium. Its high specific and latent heats render water so much slower than air to change its temperature that aquatic plants are little liable to have their growth checked by such changes, or to be prevented from spreading over wide areas within the same zone of temperature.

The total number of water plants is—at least among flowering plants—not large, and their geographical distribution, especially in an east and west direction, is far wider than is that of average land plants. Thus,

while most British species of aquatics range throughout the North Temperate Zone, and the rapid increase of the Water-cress (*Nasturtium officinale*) in the waters of New Zealand is well known, even the subtropical genus *Azolla* will often escape from our indoor tanks and, though susceptible to frost, spread for a time in exposed waters. The remarkable tropical order *Podostemaceæ* (dicotyledons resembling mosses or liverworts and adapted to life in rapid streams, the systematic position of which, as is common in such cases, is most uncertain) has been cited\* as an exception to the usual rule of wide distribution in the case of aquatics; but as the genera *Podostemon* and *Tristicha* extend from Brazil to Madagascar and South Africa, and the former also occurs in North America, only the species can be termed local. In tropical waters this uniformity of temperature will result in uninterrupted vegetative growth all the year round, and vegetative growth and multiplication, as opposed to sexual reproduction, appears to be a general characteristic of aquatic plants.

In temperate waters hibernation becomes a necessity, since almost all aquatics are perennial, and, as such, would be liable at the surface of the water to be destroyed by frost. In the whole series of aquatics *Marsilia*—one of the Hydropteridæ—*Najas* and *Subularia* are almost the only annuals, the generally perennial habit being perhaps itself the result of the encouragement of vegetative growth by a uniform temperature. Hibernation is carried out in a variety of ways. *Ruppia*, *Zannichellia*, *Callitriche*, and *Ceratophyllum*, for example, remain unaltered, the last named sinking to the bottom in autumn and rising again in spring. A second group, including the Water-lilies (*Nymphaeaceæ*), *Potamogeton natans*, and others, form more or less fleshy or starchy rhizomes in the mud and die down to them in autumn, like ordinary terrestrial herbaceous perennials. A third group, such as *Potamogeton pectinatus*† and *Sagittaria* form tuber-like branches. In the Arrow-head (*Sagittaria sagittifolia*, L.) these “renewal shoots,” as they have been termed, are short branches, formed in the axils of the leaves,

which burrow into the mud and swell up at the ends each into a large bud whose central axis is swollen with reserve materials. In spring this develops into a new plant.‡

This type nearly approaches some of the fourth group, a large series that form special winter buds, generally large buds with closely packed leaves which drop off and sink to the bottom in autumn, rising again in spring. Such buds are formed at the ends of horizontal stolons in the Frog-bit (*Hydrocharis Morsus-ranæ*, L.). Kerner gives § an interesting figure of *Potamogeton crispus*, L., which, he says,

produces late in autumn, near the surface of the water, shoots possessing short leaves which are detached from the old stem before the uppermost layer of water is frozen. These sink . . . and bore their way into the mud by their pointed lower extremities.

\* J. C. Willis, *Manual and Dictionary of the Flowering Plants and Ferns* (1897), vol. ii. p. 302, a work to which I am mostly deeply indebted for information and suggestion.

† Schenk, *Die Wassergewächse*, Bonn (1886), p. 86.

‡ Willis, *op. cit.* ii. 335.

§ Kerner von Marilaun, *Natural History of Plants* (Eng. trans.), vol. i. p. 551.

The same author gives\* the following graphic description of the Water Soldier (*Stratiotes aloides*, L.), a rare British plant,

which, as is indicated by its Latin name, is not unlike an Aloe in appearance. During the winter this plant rests at the bottom of the pond it inhabits. As April draws near, the individual plants rise almost to the surface and remain floating there, producing fresh sword-shaped leaves and bunches of roots which arise from the abbreviated axis, and finally flowers which, when the summer is at its height, float upon the surface. When the time of flowering is over, the plant sinks again to mature its fruit and seeds, and develop buds for the production of young daughter-plants. Towards the end of August it rises for the second time in one year. The young plants, that have meantime grown up, resemble their parent completely, except that their size is smaller. They grow at the end of long stalks, springing from amongst the whorled leaves, and the stately mother-plant is now surrounded by them like a hen by her chickens. During the autumn the shoots connecting the daughter-plants with their parent rot away, and, thus isolated, each little rosette, as well as the mother-plant, sinks once more to the bottom of the pond and there hibernates.

Whilst *Utricularia*, *Hottonia*, and *Myriophyllum* behave in an essentially identical manner, we have in the Duckweeds (*Lemnaceæ*) a slightly different *modus operandi*, numerous minute lateral branches forming in autumn in the groove under the edge of the flat green discoid stem and becoming detached. The mother plant sinks, and these offsets start growth as new plants in the spring.

The Duckweeds are also an illustration of the practical substitution of vegetative reproduction for flowering among aquatics. Others are the Hornwort (*Ceratophyllum*), in which the plant decays away behind, as it grows in front, so that the branches become detached as separate plants, and the American Water-weed, *Elodea canadensis*, in which, though the pistillate plant has spread over almost all the inland waters of Western Europe during the last sixty years, by the breaking-off of branches, the pollen-bearing plant is all but unknown.

Is it possibly only another phase of this disuse of sexuality, or of the general reduction of type which has been stated to characterise aquatics, that brings it about that so many of the recorded cases of abnormality in the cotyledons occur in this group and in marsh plants? Mr. Guppy records† 6 per cent. of the seedlings of *Callitha* that he observed as tricotyledonous, 2 per cent. as dicotyledonous with one cleft cotyledon, and 1 per cent. with two pairs of cotyledons; monocotyledonous and tricotyledonous seedlings in *Limnanthemum* and *Samolus*; 6 per cent. tricotyledonous in those of *Scrophularia aquatica*; and 17 per cent. monocotyledonous in those of *Myriophyllum spicatum*.

Water, again, offers a considerably obstructing action to light, so that not only are the depths of the sea destitute of green plants, whether algal or otherwise, but at more moderate depths plants present the features characteristic of shade-plants. The internodes of their stems are frequently elongated: there is chlorophyll in the epidermal cells of their submerged leaves; and the small amount of assimilation (chlorophyllian action) is evidenced by the absence of palisade-tissue, whilst the absence of transpiration renders the spongy mesophyll unnecessary, so that the leaves are excessively thin—often little more, in fact, than the two

\* *Op. cit.* i. 76.

† "Irregularity of some Cotyledons," *Science Gossip*, 1895, p. 171, quoted by Lord Avebury, *On Seedlings*, popular edition (1896), p. 247.

epidermal layers and the veins. Floating leaves, it need hardly be remarked, will still more effectually exclude light from those that are submerged; and this tends to bring about a physiological division of labour in those cases of heterophylly, or the occurrence of two kinds of leaf on one plant, to which I shall presently again allude. It is no doubt the demand for light that brings about the ribbon-like elongation of some submerged leaves. Thus in *Sagittaria*, whilst those leaves, usually the majority, that project above water are arrow-shaped, floating leaves have an ovate blade, and fully submerged ones are ribbon-like. In swift currents the leaf-blade is sometimes suppressed, the petiole forming a flat, limp pale strip 70 centimetres (28 inches) long, and 1-2 centimetres broad, which might easily be mistaken for the leaf of *Vallisneria*.\*

In *Callitriche*, the Water Starwort, the submerged leaves are longer and narrower the deeper they are below the surface; and in *Hippuris*, the Mare's-tail, whilst the aerial leaves are only from seven to nine times as long as they are wide, the flaccid submerged ones are thirty times their width.†

One of the most important aspects of water as a medium for plant life is the presence in it of dissolved gases. Though many so-called aquatic plants are not free-swimming or floating organisms, but are rooted to the bottom and may obtain part of their food in this way from the soil, the greater part of their food is undoubtedly in solution. Decomposing animal and vegetable bodies give rise to ammonia, a highly soluble source of nitrogen for submerged plants; whilst, owing to the difference in the solubility of oxygen and carbon-dioxide, water contains less oxygen and more of carbon dioxide in proportion than does the air. Since air contains more oxygen and less carbon dioxide than is desirable for the most favoured vegetation, the water-plant has in this respect an advantage. Correlated with this presence of gaseous food throughout the medium surrounding them is the absence of cuticle, the copious branching of stem and leaf, and the reduction or absence of roots in aqueous plants. The numerous and large intercellular spaces also, which are so marked an anatomical feature in aquatics, though undoubtedly they may often perform the distinct function of acting as floats, buoying up the plant to the light at the surface of the water, are connected with gaseous nutrition.

Water plants [says Sachs ‡] are of peculiar interest, because their intercellular spaces do not open outwardly through numerous stomata, but communicate with large cavities which are formed in the interior of the tissues by the disjunction of cells or [less commonly] by their union with one another by the rupture of their walls. The underground stems of *Equisetum* and of many bog-plants show similar phenomena. Uninjured plants of this kind are closed and air-tight outwardly: the gases which collect in the cavities can originate only from the surrounding tissues, which absorb oxygen, nitrogen, and carbon-dioxide by diffusion from the surrounding water. These gases cannot at once diffuse through the surrounding tissues, but undergo change within them, and when once collected in the spaces they are still further influenced by the chemical changes that go on in the surrounding tissues. A submerged water-plant, for example, which contains chlorophyll absorbs carbon-dioxide from without under the influence of sunlight; and at least a portion of the disengaged oxygen collects in the cavities. When it becomes dark this process ceases. The collected

\* Goebel, *Pflanzenbiologische Schilderungen*, ii. 290, and Kerner, *op. cit.* ii. 502.

† Kerner, *op. cit.* ii. 505.

‡ Julius Sachs, *Lehrbuch der Botanik*, first English edition (1875), pp. 615, 616.

oxygen is now absorbed by the fluids of the tissue and gradually transformed into carbon-dioxide, which can again diffuse back into the cavities, but partially also through the layers of tissue into the surrounding water. This, as well as the different coefficients of diffusion of the gases, causes the air contained in the cavities to have an altogether different composition from that in solution in the surrounding water, and this composition to be subject to continual change, as also will be the pressure.

The carbon-dioxide taken in by aquatic plants is partly dissolved in the water as such, and partly as calcium-bicarbonate. The plant taking in part of the carbon-dioxide in this bicarbonate converts it into the insoluble monocarbonate, which is thereupon thrown down as an incrustation on the surface of the plant. This is the origin of the calcareous covering alike of Nullipores in salt water and of the Characeæ and others in fresh water.

The much-branched character of the stems, and still more of the leaves, of water-plants serves to expose a maximum of surface to the surrounding nutrient medium, though deficiency of light and mechanical considerations are also important contributing causes for the dissected submerged leaves of the numerous heterophyllous aquatics, such as *Salvinia*, *Trapa*, *Cabomba*, and the Batrachian *Ranunculi*. This dissection of the leaf is commonly associated with the absence or reduction of the roots. Thus the rootless *Salvinia*, one of the Hydropterideæ, and the widely separated Water-chestnut, *Trapa*, allied to the *Onagraceæ*, agree in having hair-like divisions of submerged leaves which resemble roots and serve undoubtedly to absorb the liquid food, while the floating leaves assimilate. *Riccia*, *Wolffia*, *Ceratophyllum*, *Hydrocharis*, and *Aldroanda*, wide apart systematically, are all rootless, and *Utricularia* is so even in the embryo. Though possessing roots, *Butomus*, *Callitha*, *Hippuris*, *Myriophyllum*, *Menyanthes*, *Castalia*, and *Lemna* are all destitute of root-hairs. As, however, one of the main functions of roots is to take in the water required for transpiration, this absence of root is connected as much with the absence of transpiration in submerged structures as it is with the cognate feature of absorption of dissolved gaseous and saline food through the whole surface. The numerous water-plants that are not free-swimming and rootless, but are anchored to rocks or mud, such as *Fucus* and many *Floridæ*, *Isotetes*, *Pilularia*, *Potamogeton*, *Zostera*, *Elodea*, *Vallisneria*, and many others, depend upon their roots for little beyond the mere attachment, absorbing saline food in large proportions by their whole surface, which is often specially adapted for this function. Thus fresh water when "soft," i.e. free from lime and iron salts, is poor in vegetable life: marine Algæ are well known to take in large proportions of soda and iodine, substances that are not physiologically essential to them, their ash, in consequence, exceeding that of land plants; and no plant ash yields on analysis such high percentages of iron as those of *Trapa* and *Lemna*.\*

Transpiration, or the passing-off of water vapour from the plant into the air, though a function which is retained by floating leaves is absent from submerged parts, and its absence entails most important histological changes. Thus in floating leaves, such as those of *Nymphæa*,†

\* 7.4 per cent. in the ash of *Lemna*, 29.6 in that of the leaves, and 68.6 per cent. in that of the pericarp of *Trapa natans*.

† I employ Linneus' generic name for the Yellow Water-lilies, often named *Nuphar*, using, according to the strict law of priority, Salisbury's generic name, *Castalia*, for the White Water-lily and its allies.

the stomata, or transpiration pores, are on the upper instead of on the under surface. In *Hippuris*, which grows partly above water, the stem has a cuticle, and, though its vascular bundles are "cauline," *i.e.* are not at first united to those of the leaves, they do contain some vessels with lignified walls; but whilst the short thick leaves above water have a cuticle, stomata on both surfaces, palisade tissue, and several vascular bundles, the thinner and paler submerged ones have neither stomata nor cuticle, much less mesophyll, with no distinct palisade tissue, and with but one vascular bundle. The completely submerged *Elodea*, on the other hand, has no stomata, no vessels with lignified walls, and a vascular bundle in the leaf consisting of but little more than two or three bast-fibres.\* The typical hydrophyte, in fact, being without transpiration, is destitute of water-conducting tissue, of stomata, tracheæ, or tracheids.

Air, on the other hand--or perhaps rather various gases, including those that constitute air--is specially secreted, not only by true hydrophytes or aquatics, but also by marsh plants. This secretion takes place in numerous and extensive intercellular spaces without openings to the exterior, sometimes forming a tissue that may be termed *aerenchyma*. More than one function would seem to be served by these air-cavities: (i.) they serve to store up gaseous food, which is gradually taken into the protoplasm of the actively living cells in its anabolic processes by diffusion, as I have already described (p. 68); (ii.) they serve as floats; or (iii.) they serve to introduce oxygen for respiration to parts submerged in water or mud. The well-known air-bladders in the Bladder-wracks (*Fucus vesiculosus*, &c.) and the inflated hollow leaf-stalks in the rosettes of leaves of *Trapa natans* and *Eichornia* (*Pontederia*) *speciosa* would seem to serve only as floats bringing the plants to the surface, and so facilitating their assimilation. It was formerly erroneously supposed that the traps of the Bladderworts (*Utricularia*) were also floats. It may well be supposed that the very large symmetrically disposed air-cavities in the mesophyll of the floating leaves of *Salvinia* and those in *Alisma* and between the stellate cells of *Juncus*, together with the extensive tubulation of both petioles and peduncles in Water-lilies, and the spaces, partitioned off at intervals by diaphragms one cell thick, in the stems of *Hippuris* and *Myriophyllum*, serve other uses beyond merely acting as floats, secreting the gases utilised in metabolism. The most interesting and least understood tissue, however, in this connection is that secondary tissue, originating in a phellogen near the surface of roots or stems, to which the name "*aerenchyma*" has been specially applied. This is a loose corky tissue containing large intercellular spaces, and is more characteristic of marsh plants or semi-aquatics than of true hydrophytes. In the deciduous Cypress of the Mississippi (*Taxodium distichum*, Rich.), for instance, hollow ascending branches known as "knees" rise from the roots above the surface of the swamp, and in various genera known as "Mangroves" but belonging to different Natural Orders, in *Bruguiera* in *Rhizophoraceæ*, *Sonneratia* in *Blattiaceæ*, and *Avicennia* in *Verbenaceæ*, we have similar roots ascending to the air and developing

\* F. O. Bower, *Practical Botany*, 3rd edition (1891), pp. 110-12, 138-9, 171-2, 180.

this form of tissue.\* *Sesbania aculeata*, Poir., the "Danchi" of India, a tropical leguminous plant, is described† as a marsh plant giving off floating roots from the base of the stem, covered with a spongy aerenchyma, whilst in *Neptunia oleracea*, Lour., which belongs to an altogether different subdivision of the same great order, the *Mimosaceæ*, it is a floating stem which produces this spongy tissue. A terrestrial species, *N. plena*, has no such structure. These aerenchymatous structures are now generally believed to serve to conduct down to the more completely submerged structures the oxygen required for respiration. I think, therefore, that Kerner's description‡ of another tropical aquatic mimosad, *Desmanthus natans*, is physiologically inadequate.

In *Desmanthus natans* [he says] an actual swimming apparatus is developed, not in the leaf-stalks, but in the stem itself. It takes the form of a large-celled, spongy, air-containing mantle, arising here below the epidermis of the internodes, which renders sinking impossible. The Mimosa-like foliage-leaves rise up from the nodes of these floating stems like masts with flags. When the leaves turn yellow the stems rid themselves of their swimming organs, which are no longer needed, and indeed it appears to be an advantage to the leafless stems to be able to sink down and to obtain a period of rest at the bottom.

Without for one moment questioning the fact of the plant floating, I would suggest that it does so, not merely, as in *Trapa* and *Eichornia*, to facilitate assimilation, but also for respiratory oxygen. The disappearance of the aerenchyma in the resting stage is an interesting case of rapid adaptational change in structure. These instances from the *Leguminosæ* lend additional interest to the variety offered by two species of the tropical genus of *Onagraceæ* *Jussiaea*, figured and described by Goebel.§ One, *J. suffruticosa*, L., has an erect stem which only develops aerenchyma over the lower part of its surface when the plant is growing in water, whilst the other, *J. repens*, L., when in water, produces some ascending aerenchymatous roots which reach the surface, as in the Mangroves. Among British plants the Great Water Dock (*Rumex Hydro-lapathum*, L.) sometimes produces roots of this character, whilst the Gipsy-wort (*Juncopus europæus*, L.) and the Purple Loosestrife (*Lythrum Salicaria*, L.) produce aerenchyma on submerged parts of their stems.

Many are the structures in plants which are susceptible of a purely mechanical explanation. The weight of branches and leaves, for instance, necessitates, in an aerial stem that does not climb, the presence of more or less rigid woody "mechanical tissue," as it is called. The buoyancy of water, however, renders this unnecessary.

Firm woody cells and strands of elastic bast-fibres [says Kerner ||] which play such an important part in the aerial portions of plants, are wanting here. Woody plants neither grow in the sea, nor in fresh water. Aquatic plants, indeed, quickly collapse, in consequence of the absence of wood and bast, when brought from the depths into the air: the leaves collapse of their own weight, and sink flaccidly on to the substratum. They are able to retain an erect position in the water, because a portion of their tissue is penetrated by comparatively large air-spaces, by which means their specific gravity, compared with that of the water, becomes much diminished.

\* Goebel, *Berichte d. Deutsch. Botan. Gesellschaft*, iv. (1886), Berlin, p. 249, and *Pflanzenbiologische Schilderungen*, i. 139.

† J. C. Willis, *op. cit.* n. 351.

‡ *Op. cit.* i. 663.

§ *Pflanzenbiologische Schilderungen*, ii. 256.

|| *Op. cit.* i. 424.

It is the general rule among Dicotyledons that the vascular bundles are common to, and continuous in, leaf and stem, and it is only in a few water-plants, viz. *Hippuris*, *Aldrovanda*, *Ceratophyllum*, and *Trapa*, that, as an exception to this rule, we find a single axial vascular cylinder developing constantly at its apex through the stem, and with which the veins of the leaves only become subsequently united.\* This axial strand is adequate to withstand what little strain there is upon the stem. With this reduction of vascular tissue in submerged structures we may class the fact that some of the Water Crowfoots present the exceptional character of "free" veins in their leaves—veins, that is, which end in the cellular tissue without anastomosing with the ultimate branchings of other veins. This is a return to a more primitive condition which prevails in many Ferns and Gymnosperms.

Plants in rapidly moving water, such as *Fucus*, *Myriophyllum*, some *Potamogetons* and *Podostemaceæ* have generally a leathery exterior, such as also characterises floating leaves. Nor is it only in internal structure that these plants are adapted to the conditions of the medium in which they are, for not only, as is well known, do Water Crowfoots in running water cease to form any floating leaves and elongate

those long mosses in the stream,

as Tennyson styled them, but Mr. Hiern has traced an elaborate mathematical connection between the forms of their floating leaves,—when they have any,—and the resistance of the current.†

One other common peculiarity of the vegetative structures of aquatic plants, and one the precise significance of which is not, I think, as yet known, is their sliminess. In some Algae this excretion, by which we are enabled to readily fasten down specimens on paper, would seem to be an actual exudation of protoplasmic matter through the walls of the outermost cells; but in flowering plants it is generally an excretion of mucilage by special glands or hairs on the surface. However produced, it undoubtedly hinders the diffusion of soluble cell-contents into the surrounding water; but it is by no means certain that this is the only or main cause of its occurrence.

Having now alluded to the more general characters of the vegetative structures in water-plants, we are in a better position to consider the question of their origin. In the almost complete absence of evidence from fossils, what the nature of the first plants to arise on the earth was must be a mainly speculative inquiry. If, however, these may have been Myxomycetes, or Fungi, rather than Algae, that is to say, plants destitute of green colouring-matter, it is probable that the simplest, and therefore theoretically earliest, of the Algae were of a very early date; nor is there any reason to look upon them as derived from fungal types. In this connection it is noteworthy that Algae of very simple structure are world-wide in distribution, and occur in salt, brackish, and fresh waters; that they all contain chlorophyll, and that in many of the lowest types it is not asso-

\* Goebel, *Outlines of Classification and Special Morphology*, Oxford, 1887, p. 462.

† W. P. Hiern, *On the Forms and Distribution of the Batrachium Section of Ranunculus* (revised from the *Journal of Botany*, 1871), pp. 21, 22.

ciated with any other colouring-matter; that, though often floating just below the surface, even when anchored, they pass their whole life in a submerged condition; and, finally, that their chief reproductive structures, whether vegetative or sexual, the zoospores and antherozoids, are free-swimming ciliated bodies. These characters all point to the *Algæ* being primitive aquatics, having, that is, no terrestrial ancestry. The production of ciliated antherozoids, requiring at least a little water in which to swim, would point to a similar ancestry for the now largely terrestrial Bryophyta and Pteridophyta.\* When, however, we turn to flowering plants it is doubtful if we can find any such primitively aquatic types. There are many that vegetate under water, and not a few free-floating rootless forms, many too that ripen their fruits under water; but flowering, or the pollination of the flower, nearly always takes place above or on the surface; and, in those cases in which it does not do so, there are generally some characters suggesting that the submerged type is the modified descendant of some allied land-plants. An aquatic ancestry has been suggested for Monocotyledons, and the theory is borne out, not only by the simple, glabrous, and entire leaves, so common in the Class, but especially by the ribbon-like form so frequent in the cotyledonary leaves. The substitution of granular pollen for a ciliated swimming antherozoid is, however, a crucial objection, and in most cases other details in flowering and pollination point to an ultimately, though possibly remotely, terrestrial derivation. No flowering plant is so completely adapted to an aquatic life as is the marine Eel-grass, or Grass-wrack (*Zostera*), now known in commerce as a packing material under the name of Alva. Widely distributed, the five species of this genus grow with creeping stems rooted in the mud on gently sloping shores, and bear long thin limp linear ribbon-like leaves, sheathing at their bases. The sheath of the uppermost of these leaves serves as spathe to a flattened spadix. The anthers burst under water discharging the elongated, tubular, one-coated pollen, which is carried by the water to the long thread-like and also submerged stigmas. These pollen threads are of the same specific gravity as the sea-water, so that they float at any depth.† Though Delpino has suggested that *Zostera* is an Aroid adapted to a submerged existence, such genera as *Posidonia* and *Ruppia* connect it with *Potamogeton*, and it has been also suggested that the fertilisation may be modified from an earlier wind-pollinated condition. In *Ruppia*, however, the flowers are at the surface of the water, and the granular pollen floats on the surface; whilst in the allied *Zannichellia* the pollen is spherical in the anther, but becomes tubular when discharged, and performs its function under water, much as in *Zostera*. Similar extreme adaptations occur in *Najas* and *Ceratophyllum*, pointing to an extremely remote, although not primitive, aquatic ancestry in these cases. The extreme

\* Dr. D. H. Scott has the following suggestive passage on the connection between the alternation of generations and the change from aquatic to terrestrial life in his *Structural Botany*, part ii. (1896), p. 297:—"The sporophyte of the higher plants, whatever its origin may have been, is specially adapted to the formation of aërial, as distinguished from aquatic, spores. The spores of the Archegoniata, from the lowest Bryophyta upwards, differ from those of any of the *Algæ* in being almost always suited for dissemination by the air. The sporophyte which bears them is essentially the aërial generation, while the oöphyte is dependent on water for the act of fertilisation."

† Schenk, *op. cit.*; Kerner, *op. cit.* i. 666, ii. 104, 105; Willis, *op. cit.* ii. 397, 398.

modification of such ordinal types as *Naiadaceæ*, *Ceratophyllaceæ*, and *Podostemaceæ* makes it a matter of the very greatest difficulty to the systematist to place them satisfactorily in his scheme of classification; so, though it is probable that they are descended from marsh plants which were gradually driven by the struggle for existence to adopt a purely aquatic mode of life, it would seem that this was at a far more remote date in these cases than in others. There are perhaps barely fifty species that discharge their pollen under water. The well-known case of *Vallisneria spiralis*, in which the pistillate flowers are carried up to the surface by long rapidly-growing and spirally-coiled peduncles while the staminate ones break off at the bottom and rise to the surface before unfolding, is an obvious adaptation of a plant of terrestrial ancestry not only to water, but to water of varying depth. When, as is so often the case, we find aquatic genera or sub-genera, such as *Hottonia* and *Batrachium*, in orders otherwise terrestrial, we should *a priori* assume that their aquatic adaptation is of a more recent date; and the Water Crowfoots are a striking example of the puzzling variability or instability of character that distinguishes such modern evolutions. That great modification in response to changed conditions may occur within the limits of a single species we have already seen in several instances. In the case of the Brooklime (*Veronica Beccabunga*, L.) the leaves when submerged form only four or five layers of mesophyll cells instead of ten or twelve: the Flote-grass (*Glyceria fluitans*) produces submerged leaves three times as long as, and rather narrower than, those grown on land: similar differences are recorded in the cases of *Elatine*, *Castalia*, and others;<sup>1</sup> and the Bur-marigold (*Idem*), a water-side plant, when growing in the water is stated to lose all woodiness and to form air-canals in its cortical tissue. The most rapid recorded case of adaptation, however, is, perhaps, that of a Common Daisy (*Bellis perennis*, L.) recorded by Mr. G. D. Leslie, R.A., in that charming work "Letters to Marco." This plant, which normally has its leaves spreading horizontally on the ground, during a few days of river flood which covered Mr. Leslie's lawn at Wallingford raised them into an almost erect position, as if emulating a submerged *Stratiotes* or *Lobelia*.

That we can show such adaptation to be progressive, I will only illustrate by the case of *Potamogeton* cited by Schenck. *P. natans*, L., the least modified or most ancestral, has its upper leaves ovate, leathery, and floating, and the lower ones submerged and sometimes linear. It dies down in winter to the rhizome. *P. heterophyllus*, Schreb., has all its submerged leaves narrow. *P. lucens*, L., *P. crispus*, L., &c., have all the leaves submerged and lanceolate, and form winter buds. *P. obtusifolius*, Mert. and Koch., *P. pusillus*, L., &c., have long, narrow, ribbon-like leaves, all submerged; and *P. trichoides*, Cham. and Schlecht., with a thread-like stem and bristle-like leaves, is the most highly modified of all.

This example, or the genus as a whole, serves to illustrate the varying directions which the adaptation takes, according to the conditions. The leaves of aquatics must, in fact, be grouped under four very distinct types—the floating, ribbon, much-divided, and subulate types. Of these the

<sup>1</sup> Kerner, *op. cit.* ii. 505.

first, illustrated by the Water-lilies, *Nymphaea*, *Hydrocharis*, *Potamogeton natans*, &c., is more or less rounded, leathery, with an upper surface like that of land-plants, but having the stomata upon it, and with a leaf-stalk capable of intercalary growth at its junction with the blade. Goebel points out that *Nymphaea* presents an advance upon *Castalia*, in that the leaf in the former springs from the peduncle, so that food could travel to the seeds direct instead of going down a long petiole to a rhizome and then up a long peduncle. The ribbon type of submerged leaf occurs in *Callitriche*, longer and narrower the deeper they are below the surface, in *Vallisneria* and in some of the leaves of *Sagittaria*, *Glyceria*, &c. The much-divided leaf occurs with others of the floating type in *Salvinia*, *Trapa*, Water Crowfoots, and in *Cabomba*, one of the Water-lily family, and by itself in *Myriophyllum*, *Hottonia*, *Utricularia*, &c. With this type we should perhaps associate the unique leaves of the Lattice-leaf of Madagascar (*Aponogeton fenestrata*, Hook. fil.), submerged leaves of oblong form, in which most of the cellular tissue between the intersecting veins breaks up as the leaf grows, leaving perforations. Goebel points out \* that here water with its dissolved gases has ready access to all parts of the leaf, so that none of the intercellular spaces which occur in other aquatic leaves are requisite. The subulate, or awl-shaped, type, generally in radical rosettes ascending from the bottom of lakes of varying depth, is approximated in the flat leaves of *Stratiotes*, and more characteristically seen in *Isotria*, *Subularia*, *Lobelia Dortmunda*, and *Intorella*. The last-named exhibits a marked difference, its leaves when submerged being longer, more erect, and more cylindric than when not so. It is, I believe, a general characteristic of this type of leaf to have an apical growing point of long-continued, though limited, growing power.

The varying directions taken by adaptation might equally be illustrated by the flowering processes of aquatics, where, besides such submerged types as *Zostera*, we have floating "hydrophilous" forms like *Vallisneria*, wind-pollinated flowers like the Bur-reed (*Sparganium*), and insect-pollinated ones like *Utricularia*. I have perhaps, however, already said enough to illustrate the great variety of plants which have been made by the conditions under which they find themselves to approach one another in certain characters, especially those of their tissues and vegetative structures.

Time does not allow any adequate treatment of the last great problem in connection with these adaptations, viz. the extent to which they are hereditary. Kerner, after describing many modifications produced by change of soil and climate, says † that "they were also manifested by the descendants of these plants, but only as long as they grew in the same place as their parents," and he thus discriminates between inherited characters, which he considers specific, and those liable to disappear by reversion, which he terms varietal. It nowhere appears, however, that in the course of his experiments he did anything to test the question whether in a series of generations grown under identical conditions characters originally acquired, and liable to disappear by reversion, do

\* *Pflanzenbiologische Schilderungen*, ii. 319.

† *Op. cit.* ii. 514.

not become more and more fixed—in other words, tend gradually to pass over from the group which we term adaptational to that which we term ancestral. This is, I would suggest, probable, though it would undoubtedly require a long-continued series of experiments to demonstrate it.

## APPENDIX.

Classification of Angiosperms, according to Eichler's *Natürlichen Pflanzenfamilien* (1892-6), showing the independent origin of the aquatic habit in a comparatively small number of cohorts.

### CLASS I.—MONOCOTYLEDONES.

- |        |                  |                           |   |
|--------|------------------|---------------------------|---|
| Cohort | 1. Pandanales.   | <i>Typha, Sparganium.</i> |   |
| „      | 2. Helobiæ.      | Almost entirely aquatic.  | <i>Potamogetonaceæ, Naiadaceæ, Aponogetonaceæ, Juncaginaceæ, Alismaceæ, Butomaceæ, Hydrocharitaceæ.</i> |
| „      | 3. Glumifloræ.   | Few aquatics, such as     | <i>Glyceria fluitans</i> and <i>Scirpus lacustris.</i>  |
| „      | 4. Principes.    | Palms.                    |   |
| „      | 5. Synanthæ.     | Cyclanthaceæ.             |   |
| „      | 6. Spathifloræ.  | Araceæ, including         | <i>Acorus, Pistia, Orontium, Lemnaceæ.</i>  |
| „      | 7. Farinosæ.     | <i>Pontederiaceæ.</i>     |   |
| „      | 8. Liliifloræ.   | <i>Juncus.</i>            |   |
| „      | 9. Scitamineæ.   |                           |   |
| „      | 10. Microspermæ. | Orchids, &c.              | } Few, if any, aquatics.  |

### CLASS II.—DICOTYLEDONES.

#### SERIES 1.—ARCHICHLAMYDEÆ—

- |        |                     |   |
|--------|---------------------|---|
| Cohort | 1. Piperales.       | } Few, if any, aquatics.  |
| „      | 2. Juglandales.     |   |
| „      | 3. Salicales.       |   |
| „      | 4. Fagales.         |   |
| „      | 5. Urticales.       |   |
| „      | 6. Proteales.       |   |
| „      | 7. Santalales.      |   |
| „      | 8. Aristolochiales. |   |
| „      | 9. Polygonales.     | <i>Rumex Hydrolapathum. Polygonum amphibium.</i>                        |
| „      | 10. Centrospermæ.   | Few, if any, aquatics.  |
| „      | 11. Ranales.        | <i>Nymphæaceæ, Ceratophyllaceæ, Ranunculaceæ, including Batrachium.</i> |
| „      | 12. Rhæadales.      | Cruciferæ, including <i>Subularia</i> and <i>Roripa.</i>                |
| „      | 13. Sarraceniales.  | No true aquatics.   |

- Cohort 14. Rosales. *Podostemaceæ*, Leguminosæ, including *Desmanthus*, *Neptunia*, *Sesbania*.
- „ 15. Geraniales. *Callitrichaceæ*.
- „ 16. Sapindales
- „ 17. Rhamnales. } Few, if any, aquatics.
- „ 18. Malvales. }
- „ 19. Parietales. }
- „ 20. Opuntiales. }
- „ 21. Thymelæales. }
- „ 22. Myrtifloræ. *Lythrum*, *Rhizophoraceæ*, *Haloragidaceæ*, *Tropea*, *Jussiaea*.
- „ 23. Umbellifloræ. Few, if any, true aquatics. *Hydrocotyle*.

SERIES 2.—SYMPETALÆ—

- Cohort 1. Ericales. No aquatics.
- „ 2. Primulales. *Hottonia*.
- „ 3. Ebenales. No aquatics.
- „ 4. Contortæ. *Gentianaceæ*, including *Villarsia*, *Limnanthemum*, *Menyanthes*.
- „ 5. Tubifloræ. *Scrophularia*, *Lycopus*, *Myosotis*, *Veronica*, *Utricularia*, &c.
- „ 6. Plantaginales. *Littorella*.
- „ 7. Rubiales. } Few, if any, aquatics.
- „ 8. Aggregatæ. }
- „ 9. Campanulatæ. *Bidens*, *Lobelia*.

The aquatic orders and genera are in italics.



FIG. 6.—CYPRINOPEDIUM 'MONARCH.' (*The Garden*.)

## PROTOPLASM: WHAT IT IS, AND HOW IT MAINTAINS PLANT-LIFE.

SUBSTANCE OF A LECTURE AT CHISWICK GARDENS.

By Rev. Prof. G. HENSLOW, M.A., V.M.H., &c.

[June 20, 1900.]

If a section be made of any growing shoot or root, the earliest condition of a living cell reveals a delicate cell-wall, within which is a mass of colourless protoplasm, completely filling it, with a relatively large oval body, called the nucleus, in the middle. The cell-wall is really a sort of secretion from the living protoplasm, and consists of the three elements carbon, hydrogen, and oxygen in the proportions  $C_6H_{10}O_5$ ; whereas the protoplasm is much more complicated, in the numbers of its atoms, and is composed of the elements C, H, N, O, S, and P; nitrogen, sulphur, and phosphorus being additions.

The next stage is seen when the cell has grown to a larger size and the protoplasm does not keep pace with it, so that it becomes hollowed out into "vacuoles," which become filled with watery cell-sap. It then appears as a sort of network, still suspending the nucleus in the middle. Particles can be seen moving about along the connecting threads of protoplasm.

Afterwards all the protoplasm, by the union of the vacuoles, may come to lie on the cell-wall, and the nucleus is then carried to one side. Mohl in 1846 observed this condition, and called this layer of protoplasm the "primordial utricle."

The next thing to notice is the structure of the nucleus, and to discover what part it plays in plant-life. Examined by high powers of the microscope, it is seen to be bounded by a delicate film. Within this is what looks like a tangle of knotted thread. One or more round bodies lie within the thread, called nucleoli.

When a young cell is going to divide into two, the twisted thread breaks up into a definite number of pieces called "chromosomes," each being folded like a U. At this stage the bounding membrane disappears, and the surrounding protoplasm now presses in and places the chromosomes in the middle, which arrange themselves in the equatorial plane. Now two star-like bodies appear, called "directing spheres," in the protoplasm, and between them fine lines are seen forming a spindle connecting the two spheres. The twelve chromosomes now divide again, and each half, attaching its two ends to a line of the spindle, glides along it till it reaches one of the poles, so that one half of the chromosomes go to one pole, the others to the other pole. There the collection of chromosomes unite and form a daughter nucleus. A cell-plate now appears across the equator of the spindle, and is gradually extended through the outlying protoplasm till it reaches the walls of the cell. Thus two cells are made out of one.

If the nucleus be at the side of the cell, it has been seen to travel across, dividing in its course and laying down the plate in its passage from one side to the other. If an elongated tube be required, such as of a sieve-tube or a liber fibre, the nucleus repeatedly divides without laying down any cell-plates, till the cell be long enough, when the nuclei become absorbed. Similarly in the formation of endospermial tissue, within the embryo-sac, the nucleus may divide till there are numerous ones of successive generations; but subsequently cell-walls are formed between them.

Conversely, to form vessels, large drum-shaped cells are piled one upon another, but by their partitions becoming absorbed they form long and large tubes, such as form the holes seen in a piece of oak-wood. When the two daughter cells are formed, fine protoplasmic threads are left passing through the new cell-plate, so keeping up a connection with the adjacent cell. This protoplasmic continuity is now believed to be universal throughout all active and living cells of the entire plant. It is thus seen that the nucleus is the most important body in the formation of new cells and tissues. Though in the dividing stage the cells are much alike, they soon acquire the forms and dimensions required in the various tissues and organs in which they occur.

Another function which special nuclei undertake to perform is that involved in the process of fertilisation of the germ-cell in the ovule by a nucleus of the pollen-tube. We must consider the chief points of construction of a pollen grain and of an ovule to understand what takes place in the formation of the embryo in the seed, which the ovule becomes. A pollen-grain consists of two spherical skins; the outer, which is often sculptured in various elegant forms, is called the "extine"; the inner and thinner one is called the "intine." When the grain reaches the viscid stigma it opens at definite places, and the intine protrudes, at first as a pouch. This being stimulated into growth by the juices of the stigma, it penetrates the style, growing on till it reaches the ovule. This it enters (being led on to the right place by the "conducting tissue" of the style, &c.) by the orifice called the "micropyle," and applies its blunt end upon the surface of the embryo-sac.

Now let us turn to the ovule. This usually consists of a solid central body surrounded by two investing skins excepting at one end, where they leave the space called the micropyle, mentioned above. Within the central body is one cell larger than the rest. This is the embryo-sac. Its nucleus behaves quite differently from an ordinary cell-nucleus, in that it divides successively into eight nuclei, of which four are found at one end and four at the other of the embryo-sac. One of each of these two groups travels to the middle, and they there coalesce to form the origin (after impregnation) of endospermial tissue.

The three upper nuclei, just below the position of the micropyle, are all capable of being impregnated and becoming embryos; but usually only one of them does so. This one is called the oosphere or germ-cell.

When the pollen-tube has arrived at and entered the micropyle, absorption takes place both of the tube and of the embryo-sac, where they are in contact, so that the two pollen-nuclei can travel through. One of them, the sperm-cell, fuses with the germ-cell to form the embryo; the

other fuses with the central or "polar" nucleus, and lays the foundation of the endosperm.

The impregnated germ-cell now enters upon a new life. Though called a "cell" it is really a nucleus with protoplasm, but without any cell-wall at all. This is now secreted, and a complete cell is thus made, in the usual sense of the term. It divides into two, and then again and again, but in one direction, making a row of cells called the "suspensor." It is not till after some time that the terminal cell divides at right angles to the other previous divisions. These two cells are the commencement of the embryo: they rapidly increase in number till a globular mass called the "pro-embryo" is formed.

In some plants, as Orchids, certain parasites and saprophytes, the embryo never progresses beyond this stage before germination.

While the embryo is thus in preparation, the central nucleus, now impregnated, divides into many nuclei, at first free in the general protoplasm of the embryo-sac. Gradually cell-walls are formed between them; so that the endosperm finally consists of a mass of cells filled with starch &c. for future use.

In many cases as fast as endospermial tissue is formed it is dissolved and consumed by means of the suspensor, the nourishment being conveyed into the embryo for its growth. This proceeds until all the endospermial tissue is gone; when the embryo becomes relatively large, having the tissue of its own cotyledons full of starch, oil, and aleurone &c. instead.

We will now follow the development of the pro-embryo: it is soon seen to change its form from a globular mass of cells to a heart-shaped body by a depression at the terminal point, in consequence of its growing more rapidly at two points. These two lobes are the foreshadowings of the two cotyledons, if it be a dicotyledonous plant.

If it be a monocotyledon, then *one* point only grows, and taking up a median line a slight depression appears at one *side*. There is much reason for believing that this arises from an arrest of one cotyledon. Indeed, both *Asparagus* and *Iris* have a rudiment of a second cotyledon, although they belong to the class Monocotyledons.

When the ovule has become a ripened seed, we find the coats have developed into the seed-skin; or various changes may take place, as in the absorption of the inner one; the outer part of the central body may form part of the skin as well.

A seed of an Orchid will illustrate the final result when the embryo was arrested at its early stage of pro-embryo. A grain of Wheat is one in which the endospermial tissue was abundantly formed, and a Pea, Bean, or Almond are cases in which the endosperm was all consumed before the embryo grew to maturity.



## PROTOPLASM: THE INSTRUMENT OF EVOLUTION AMONG PLANTS.

SUBSTANCE OF A LECTURE AT CHISWICK GARDENS.

By Rev. Prof. G. HENSLOW, M.A., V.M.H., &c.

[June 26, 1900.]

WHEN we regard the infinite diversity of plant forms in nature, the subject seems bewildering, but closer inspection shows both resemblances and differences; so that classification becomes possible.

Systematic botanists have therefore arranged all plants in groups within groups; and we thus have species, genera, and orders.

Two forces, therefore, seem to have been at work, one of which tends to perpetuate the form, so that seedlings grow up into adult plants resembling their parents. The other tends to create differences, so that we detect variations or slight differences among the individuals of any particular species. When the variations seem in the eye of the botanist to be sufficiently pronounced, he gives the plant another specific name.

The question arises, How came these two tendencies, viz. to be constant and yet to vary, in one and the same plant?

We saw in the first lecture that the process of fertilisation consisted in the chromosomes of one of the nuclei within the pollen-tube uniting with those of the egg- or germ-cell nucleus prepared for it in the embryo-sac. As the protoplasm surrounding the nucleus appears to take no part in the process we must conclude that the chromosomes carry all the hereditary powers within them; but how it is done is an insoluble mystery; and so the offspring resemble their parents, if they be two individuals of the same species. If, however, it be a hybrid, *i.e.* the offspring of two unlike species, then—as we know—it may resemble both by being intermediate in character; or either parent may have been prepotent in impressing its own features more strongly than the other.

As long as plants live under more or less precisely the same conditions, they show no signs of changing. This is particularly the case with social plants as Bluebells, Heath, Daisies, Pines, Bracken, &c. Botanists have recorded no varieties among these plants, at least in our own islands.

On the other hand, plants which are found in various soils are generally much more liable to variations. Thus Sir J. D. Hooker describes the Common Knotgrass:—“*Polygonum aviculare* proper; var., *P. littorale*, littoral, the passage to *P. maritimum*, maritime; var., *agrestinum*, a field form; var., *arenastrum*, a sand-loving one; var., *microspermum*, a small-seeded form; var., *ruvigrum*, a wayside form.”

Here we have the clue to variations. They are simply due to differences in the soil and surroundings. The “littoral” and “maritime” forms have somewhat fleshy leaves; but this character, as of the Samphire, is simply due to the presence of salt, as experiments have

shown, in which ordinary plants, as Cress, have been induced to become fleshy by watering them with a solution of salt. Still the question arises, How can such variations in plant-structure come about ?

We have seen how the nucleus by division produces two cells out of one. Secondly, we know that the cells grow into definite shapes according to their positions and requirements in the plant. Thirdly, we know that groups of such cells of various kinds form plant-organs, as roots, leaves, bracts, sepals, petals, &c. Now, when we examine such variations as mentioned in the Common Knotgrass, we see the ultimate result of the effect of the different soils upon the seeds growing up in them ; in that variations of structure appear from some one, assumed as the type form. We know, therefore, that the cells must have been grouped differently from their arrangements in the typical plant, and they thus again are due to the behaviour of the nucleus and protoplasm.

Hence there is no alternative to the statement that we must look to the protoplasm and nucleus as the responsive agents, which set to work to build up cells, &c. ; so that the altered organs may be better suited to the new conditions under which the plant finds itself.

This is why many botanists have noted the fact when exploring countries, that to look for varieties of any species, they are always more generally to be found on the confines of the geographical area, in which the plant has its special habitat ; simply because the further afield it travels the greater will be the chances of the external conditions being different.

That it is simply the environment which brings about adaptive features in plants, is seen from the fact that many of the plants of any area of a marked climatal character put on almost identically the same forms, though they may have no affinity between them whatever. Such is particularly observable in the inhabitants of such environments as very dry and barren soils, as of deserts. On the other hand aquatic plants show marked peculiarities of adaptation to a watery medium, which can only be the result of the action of the water conjointly with the adaptability of the protoplasm in the submerged plant.

As examples of desert plants there are two well marked features ; one is spinescence, if the plant be woody ; and the other is succulency, if it be herbaceous. In the deserts around Cairo one of the largest bushes (2 ft. to 3 ft.) is a member of the *Crucifere*, having stiff spines ; but other plants might be mentioned as having spiny leaves, such as *Cornulaca*, *Salsola*, &c.

In our own country spinescence is seen in Gorse, the Needle-furze, Juniper, and Rest Harrow, &c., all growing in a poor soil.

As examples of succulent plants there are the cactaceous plants of Mexico, the Euphorbias and the Stapelias of Africa.

Our Sedums, Houseleek, and *Cotyledon umbilicus* are examples.

The conclusion is inevitable that by growing under similar climatal conditions, and rocky, barren soils, having to endure long and intense droughts, plants have gradually acquired precisely similar structures, because they are the best suited for them under the circumstances. Protoplasm, being the same in all plants, has, therefore, built up similar tissues and like organs in the above named plants, although there is no

affinity whatever between them. Similarly the American Aloe (*Agave*) of Mexico resembles the true *Aloë* of Africa. The former belongs to the order *Amaryllideæ*, the latter to *Liliaceæ*.

Similarly with aquatic plants, a common and easily observed feature of submerged plants among Dicotyledons is to have the leaves finely dissected, by the interstitial membrane between the fibro-vascular cords being arrested. This occurs in such widely different plants as Water Crowfoot (*Ranunculaceæ*), *Cubomba* (*Nymphæaceæ*), *Myriophyllum* (*Haloragacæ*), Water Violet (*Primulaceæ*), *Helosciadium* (*Umbelliferae*), *Ceratophyllum* (*Ceratophylleæ*), &c.

Here, again, the conclusion is inevitable that such a degenerated condition, coupled as it is with many analogous differences from leaves which always grow in air, is the result of living submerged.

The stems as clearly show the effects of the action of the water, in having a great reduction in all the mechanical tissues required for supporting the stems and branches in air. Water-plants being nearly of the same specific gravity as water itself, they are of course not required; but their use is replaced by air-canals acting as floats to keep the plant erect under water.

Thus do we see how specific differences arise by the action of the environment upon plants, coupled with the responsive power possessed by protoplasm and the nucleus.

But we may go further. It has long been recognised that all flowering plants may be grouped into two classes, Dicotyledons and Monocotyledons. Besides the difference in the presence of two cotyledons in the embryo of the one, and one cotyledon only in the other, the leaves of the former have net-veined blades, while those of the other are parallel-veined, allowing for a few exceptions. The wood of the stem of Dicotyledons is in concentric cylinders: in Monocotyledons it is scattered about as isolated woody cords without any order. Lastly, the floral whorls are generally in fours or fives in the former and in threes in the latter.

Whence arose these differences? Comparing aquatic Dicotyledons with Monocotyledons generally, there are a great number of distinct points of resemblance; each alone might be regarded as a curious coincidence and nothing more; nor do they all occur in the same plant; but when taken collectively they amount to a formidable amount of probable evidence that Monocotyledons—though there are many now terrestrial—have descended from aquatic Dicotyledons.

Thus, *e.g.*, some aquatic plants have only one cotyledon, as the lesser Celandine (undoubtedly a water-plant originally); and the Water-chestnut (*Trapa*) is another.

In germination the primary root of aquatic Dicotyledons is arrested, so that the plant is supported on secondary adventitious roots. This is seen in germinating Water-crowfoot, *Trapa*, and the Mangroves, &c. It is universal in Monocotyledons.

The rhizome of Water-lilies has its woody cords dispersed as in a Palm-tree or Asparagus shoot.

The foliage of Water-lilies begins as phyllodes without blades, then follow in succession an oval blade, then a hastate, then an orbicular, and in the case of *Nelumbium*, a peltate leaf.

The Arrow-head (*Sagittaria*) follows suit, for as long as the leaf grows in deep water it has only a long, flat phyllode. This bears a blade only when it approaches the surface, which is at first oval, then when clear from the water it is hastate in shape.

So, too, some Monocotyledons have two cotyledons, as *Asparagus* and *Ilex*, one being rudimentary.

Some Monocotyledons, as our Lords and Ladies (*Arum maculatum*), have a blade with reticulated venation, a remembrance of its ancestral Dicotyledon.

Hence the so-called "blade" of a linear-leaved Monocotyledon, as of a grass-blade, is strictly homologous with the stalk, and is essentially a phyllode which does duty for the blade.

The reason why the parts of the flowers of Dicotyledons are in fives, and those of Monocotyledons are in threes, is explainable by the fact that when leaves are in pairs and decussate, on becoming alternate the arrangement results in "cycles" or groups of fives. But starting from a single cotyledon, the arrangement follows, which contains three leaves in a "cycle" or whorl. The two systems are therefore consequences of there being two and one cotyledon respectively.

The general conclusion is, that to look for the prime cause of evolution in plants we must turn to the protoplasm, and especially the nuclear chromosomes, as the active agents; not only in transmitting hereditary qualities, but in having the power to be affected by external forces; responding to which, they set to work to construct cells and tissues better suited to new environments; and if the action be continued for some generations, the structures become relatively fixed and hereditary, until some new conditions bring about fresh variations.



FIG. 6A.—*ODONTOGLOSSUM LUTEO-PURPUREUM* MOSSII. (*Journal of Horticulture*.)

## MORE VARIED USE OF ROSES IN GARDENS.

By Mr. GEORGE PAUL, V.M.H.

[July 3, 1900.]

## BEDDING, HEDGE, AND PILLAR ROSES.

IN the earlier years of the just finishing century, Roses took their places in gardens, in many and more varied ways than now. There were the dwarfs, on own roots--mostly kinds flowering only once in the summer (the Chinas and some very few Teas alone giving autumnal flowers)--Pillar Roses of the summer flowering kinds, and a few of the Ayrshires, hybrids of our wild field Rose, *Rosa arvensis*, on arches. Standards were a later introduction after the peace of 1815.

Later, up to a few years ago, formal Rose gardens of standards and dwarfs became the vogue, or Standards dotted on small round beds on lawns. A few gardens, such as Mrs. Bosanquet's, had pillars with chains between the posts to form a kind of margin to the garden.

It is in the past eight or nine years that some of us who have had the planning of Rose gardens have essayed to use Roses in many more varied ways; and it is their use for some of these purposes of which I have been asked to speak to-day.

Roses for bedding.

Roses for hedges (and arches, pergolas, &c.).

Roses as pillars and pyramids.

## ROSES FOR BEDDING.

The essential points required in bedding Roses are, I take it, those which render any other kind of plant what is called a bedding plant, viz. dwarf habit, freedom, and continuity of flowering, marked vividness or clear distinction in colour.

Many Roses have these points, with what other bedding plants lack, hardiness and the property of standing from year to year without renewal; hence I claim for Roses to be placed amongst the best of our bedding plants. Take the Chinas. I am writing this early in June at my cottage in Epping Forest. There is a bed of crimson China visible from the window; it is nearly in full bloom; and a bed behind it, making a background, of the common blush China is quite in flower. Passing last autumn a garden in Enfield, the last week in October I stopped to consider what was the bed of bright crimson on the lawn. It was a mass of crimson China Rose, in flower from early June until November. Pelargoniums were past; Calceolarias had been burnt up by last season's more than ordinary bright English sunlight; but the crimson China Rose was the first and last from early summer to bloom in our gardens.

Well, in late years the Chinas have been reinforced by Guillot, of Lyons, with new colours.

'Laurette Messimy,' a yellow with a rose shading crossed with the Teas, but fairly hardy. Its progeny, 'Mad. E. Resal,' with an orange instead of a yellow shading, slightly more delicate, needing a warm spot. Then

there is Messrs. W. Paul's 'Queen Mab,' a pretty dwarf apricot, which I saw finely in flower at Mr. Leopold Rothschild's garden; 'Ducher,' pure white, and 'Mistress Bosanquet,' a very old Rose (I think of Laffay), a cream colour.

One novelty, 'Cora,' lemon with a tip of carmine, I remember I bought for the charming description in the raiser's prospectus—"Merveille de grâce et de fraîcheur"—and he wasn't far wrong in his description.

Of the older sorts of Chinas 'Fabviers' and 'Cramoisie Supérieure' are good, but not so hardy, nor consequently so useful, as the Crimson China.

'La Vésuve' is a purplish crimson, and 'Abbé Miolan,' if you like purples, is slightly stronger in growth, but marvellously free flowering.

A sub-section of the Chinas are the two varieties 'White Pet' and my own 'Red Pet,' dwarfs, more resembling the Polyanthas in habit, and size, and mass of flowers than the Chinas. 'Perle des Rouges,' now called a Polyantha, should, so I think, be classed with these. My list of Chinas is not exhaustive, but those I have named are the best. Chinas like a light soil, and where this is heavy should have sand added.

Speaking of Polyantha Roses they are excellent bedders, but from their dwarf habit most valuable as edgings to other Rose beds. They have the quality that you may plant them thickly without their becoming mildewed.

The first two were Guillot's 'Paquerette,' white, and 'Mignonette,' pink: they are still amongst the best, but the now more graceful whites, 'Anne Marie Montravel' and 'Camille de Rochetaille' are, I think, freer bloomers.

As a deeper pink or rose colour 'Gloire de Polyanthas' is charming.

In yellows 'Perle d'Or' and 'Mad. F. Nolte,' a lighter shade, are the best.

In fawns and salmons 'Filius Straussheim,' 'Cécile Brunner,' and 'Georges Pernet' complete the list of Polyantha Roses.

Imagine these plants a foot high, with, say, 200 or 300 expanded miniature Roses three or four times the summer and autumn throughout. Could any plant be a better representative of bedding plants? I may add, it is desirable to remove the dead flowers when the petals have all dropped.

We have still to look to the hybrid perpetuals for the bright reds and pinks. I have been breeding for these in the single and semi-double Cheshunt and Royal Scarlets; have obtained some measure of success in getting dwarf autumnal reds, but we have more free-flowering kinds still to seek.

The best red H.P.'s are 'Victor Hugo' and 'Cheshunt Scarlet'; 'Bacchus,' a claret colour; and the old 'General Jacqueminot' and its offspring 'John D. Pawle.' 'Mrs. J. Laing' and 'Mrs. Sharman Crawford,' in rose colours, and 'Paul's Early Blush' are amongst the best, though they are rather tall for bedding Roses. 'Boule de Neige' is probably the finest white. The old 'Bourbon Malmaison,' pollarded down as you would pollard a Willow, still makes a grand bed, and the very old 'Bourbon Armosa' should for its freedom not be omitted. But the hybrid Teas are the bedding Roses *par excellence*, with one drawback—they are rather tall. 'La France' and its white variety averages

2½ feet, as do 'Caroline Testout' and 'Viscountess Folkestone.' 'Captain Christy' is somewhat shorter. Three sorts with much H.P. blood in their veins: 'Camoens,' the pink, 'Marchioness of Salisbury,' bright crimson, and 'Gruss au Teplitz,' rich crimson, are dwarfer and freer than any other red Roses, 'Camoens' flowering all through November.

Of the Teas proper the degrees of hardiness are perhaps the most essential point. The 'Hon. E. Giffard' as a white, 'Francisca Kruger' as a yellow, 'Dr. Grill,' the pink, are amongst the hardiest. They make free and good beds. 'Mad. Perney,' 'Marie Van Houtte,' 'Mad. Falcot,' 'Mad. Chedanne Guinosseau' are good yellows. 'Mad. Lambard,' 'Maman Cochet,' 'General Shabalkine,' and 'Georges Nabonnand,' in pinks are the best.

Of Noisettes 'Alister Stella Gray,' 'W. A. Richardson,' and 'Mad. Pierre Cochet' make grand beds, but they want the shoots left longer for pegging down; hence also protection of these left-long shoots throughout the winter.

The dwarfer Teas earth up till March, then prune in closely; with 3 to 5 eyes; Roses for bedding must be planted thickly 1 to 1½ foot apart.

One of the best examples of dwarf bedding Roses planted in masses is to be seen in Miss Rothschild's garden at Eythorp, Aylesbury, and at Mr. Leopold Rothschild's garden at Ascot, Leighton Buzzard; but at Mr. Robinson's, Miss Wilmot's, and other gardens Rose beds are to the front.

#### ROSES FOR PERGOLAS, ARCHES, &c.

With my friend Miss Jekyll's help I have made pergolas which leading to Rose gardens were clothed with Roses. The kinds used must be vigorous—throwing out light long graceful shoots—and free flowering. Some of the Noisettes, 'W. Allen Richardson,' 'L'Idéal,' 'Rêve d'Or,' 'Climbing Aimée Vibert,' and 'Céline Forstier,' with some Hybrid Teas, such as 'Reine Marie Henriette,' 'Cheshunt Hybrid,' and 'Bardou Job,' are good examples of this. But the type for these pergolas and arches are the Ayrshire and Evergreen Roses such as 'Félicité,' 'The Garland,' 'Flora,' 'Alice Gray,' 'Ruga,' and the 'Boursaults.' The new 'Sinica Anemone' will be charming for these purposes, being evergreen more free and seemingly hardier than the type. The best arch Roses are certainly 'Félicité' and 'Alice Gray'; perhaps for a very high arch, 'Brunoniana.'

#### HEDGE ROSES.

The Rose garden, if a formal one, is usually, for shelter, enclosed or encircled by hedges—if not entirely, certainly on the northern and eastern sides. Such sheltering hedges should be of Roses. Many good effects may also be obtained by running out at right angles short hedges, so as to form bays in which beds of the choicer and more tender Teas may well be planted.

Of course for such Rose-shelter-hedges only the very hardiest sorts must be used, and as they would probably be 6 to 8 feet high, strong growers are necessary.

I take the best six for high hedges to be single 'Carmine Pillar,'

single, carmine; 'Polyantha grandiflora,' single white; 'Turner's Crimson Rambler,' crimson; 'Psyche,' salmon pink; 'Brunoniana' (Moschata), in high and warm parts.

'Longworth Rambler'—occasionally perpetual, is a good red, but it does not make so dense a hedge as the five first named.



FIG. 7.—THE LATE LORD PENZANCE. (*The Garden.*)

Then there come the kinds which make good dense 5 ft. to 6 ft. high hedges.

'Alister Stella Gray,' double yellow, is first rate, rivalling the Rambler in masses of flower. *Rosa rubrifolia*, the red-leaved Rose, is most effective

in this class, more especially if planted against or contrasted with the hybrid Noisette 'Paul's Single White.'

The 'Dawson,' double rosy pink.

'Claire Jacquier,' a non-perpetual 'A. S. Gray.'

'Euphrosyne' and 'Thalia' and 'Aglaië,' make fair hedges of this height, but the two first are hardly marked or decided enough in colour, and the last is somewhat tender and also shy in flowering.

The Dijon Teas hardly make good, tall hedges: the shoots if left more than 4 ft. to 5 ft. long, do not break to the base, so leave bare spaces, but pruned to this height and when once formed, cut, or sheared, they make good evergreen hedges covered with flowers. A good example of such a hedge may be found in Mr. Burnett's garden at Southminster in Essex.

The beautiful hybrid Sweet Briars raised by the late Lord Penzance (fig. 7) are now becoming popularly known, and a charming 3 ft. to 5 ft. hedge can be made by planting alternately 'Lord and Lady Penzance': the blend of colour is admirable.

For terraces, as so much used in Italy, the old Blush China makes a neat, easily kept hedge. I have used it on the terraces of Cheshunt College and elsewhere. 'N. Fellenberg' and 'Arimosa,' crimson and blush, the former slightly stronger in growth than the Chinas, make good hedges of this height.

The Austrian Briars with the last year's shoots trained out make pretty narrow hedges. The double yellow Scotch is one of the most beautiful, and its large single white ally 'Altaica,' from Central Asia, should be charming in this form. The only fault of these spiny Roses is that, though welcome as coming so early, they soon pass away, and are somewhat rusty through the rest of the autumn.

Now as to making these hedges, most of the Roses named have stiff upstanding wood, so only need a helping or steadying hand to hold themselves erect. We give this by driving in light Larch or Cedar or Ash stakes of the various heights and stretching wires horizontally about 2 ft. apart, to which to tie the shoots. In making a 4-ft. hedge out-standing supports only are at first needed, to be *replaced* with longer stakes and additional wires as the Roses get up.

I need hardly point out that Roses which have to yield annually such masses of flowers should have year by year a rich dressing of manure to help them make new flower-bearing wood.

The pruning rule as to all hedges is to cut out all three-year-old wood and to lay in, slightly shortened, the best of the two-year and the strong one-year shoots. The Dijon and dwarf hedges may be spurred in.

#### PILLAR ROSES.

I think the same good qualities which go to make a good hedge Rose are those desirable in pillars and column Roses—good foliage, free flower, and, if possible, successive flowering habit.

Only some of the best are amongst the summer Roses: the same sorts which fifty years ago were the best in the garden are amongst the ones now used. The old Hybrid Chinas, 'Mad. Plantier,' 'Coupe d'Hébé,' 'Vivid,' and 'Blairii No. 2' make first-rate 8 ft. to 12 ft. pillars.

The Penzance Briars are successes: the later kinds giving some autumn flowers are the most desirable.

'Crimson Rambler' and the red Ramblers, 'Aglaie,' 'Euphrosyne,' and 'Thalia,' as well as 'Psyche,' are summer Roses.

There is a grace in some of the old Ayrshires which gives also variety to this class. 'Alice Gray' and 'Ruga' throw out slightly waving shoots.

The 'Garland' and 'Claire Jacquier' have masses of flowers.

Of the single Roses *Moschata nivea* and 'Carmine Pillar' as tall, and 'Macrantha' as a shorter pillar are the best.

But as we are seeking to have our Rose gardens autumnal flowering, so we want the pillar Roses in them to be of like character.

Are any of the *H.P.s* suitable and desirable if their sucker shoots are pruned a little long? Yes.

'Ulrich Brunner,' 'Maréchal Vaillant,' 'Mad. Clémence Joigneaux,' and 'Duke of Edinboro' and 'Duke of Teck' make fair pyramids.

But the climbing forms of 'Victor Verdier,' 'Madlle. Eug. Verdier,' 'La France,' and 'Chas. Lefebvre' are useful and amongst the best.

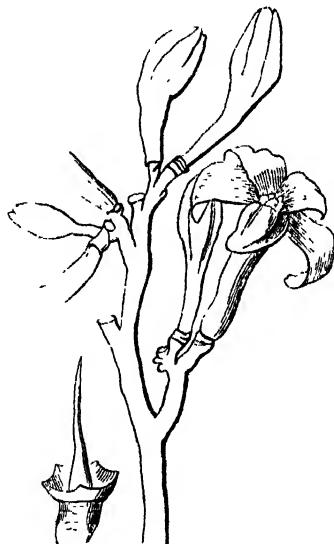
Probably 'Princess Louise,' 'Oakmont,' and 'Glory of Cheshunt' are the three best *H.P.* pillar Roses.

Most of the hybrid Teas are too sticky for pillars. 'Longworth Rambler,' 'Pink Rover' (good, Mr. Woodall tells me, on the Riviera) and 'Reine Olga' are amongst the best.

Of the Noisettes 'A. S. Gray' and 'Rêve d'Or' are fairly good. Some of the Dijon Teas, notably 'Bouquet d'Or,' are also good, but few of them are really first class.

A typically good series of autumnal pillar Roses has yet to be developed for English gardens.

I have finished my task. Such experience as I have had has been placed at your disposal. If any suggestions of mine may help to make the English Rose garden more enjoyable I shall be glad.



## THE PHENOMENA OF GERMINATION.

SUBSTANCE OF A LECTURE AT CHISWICK GARDENS.

By Rev. Prof. G. HENSLOW, M.A., V.M.H., &amp;c.

[July 4, 1900.]

THE first point to be considered is the structure of seeds. A Pea, a grain of Wheat, and the seed of an Orchis may be taken as types. The last-mentioned is the simplest, inasmuch as the embryo is never complete, but remains arrested in the so-called "pro-embryonic" condition. In the Wheat the embryo is accompanied by a large mass of reserve-food materials called "endosperm," which when ground makes flour. In the Pea all such food has been absorbed by the growing embryo itself during its formation, so that it has stored up its reserve food within the cells of the tissue of the two cotyledons or seed-leaves.

These food materials usually consist of oil, starch or cellulose, and aleurone, the last being nitrogenous.

The external conditions requisite for germination are the oxygen of the air, water, and a suitable temperature according to the nature of the plant. Also there must, of course, be an absence of noxious gases, as carbonic acid and other injurious substances, in the soil.

When these external conditions are supplied, the reserve food, hitherto insoluble and unassimilable, becomes soluble by means of ferments secreted by the embryo, and especially by the epidermis of the cotyledon in contact with the endosperm when that is present. Thus, the ferment called diastase converts the starch into maltose and dextrin. Others convert oils into glycerine and fatty acids, and thence into starch. A third group attacks the aleurone and converts its various nitrogenous products into peptone and subsequently into assimilable amides, as they are called. In some cases the food consists of the greatly thickened and solid cell-walls themselves, as of a Date-stone. This has to be dissolved in a similar way and then consumed.

The ferments, or "enzymes," however, are accompanied by a most important function, that of respiration; because the various processes carried on by the protoplasm depend upon the absorption of oxygen and its conversion into carbon dioxide by its union with carbon. The rationale of respiration is that some energy is required to decompose starch &c., but this which is lost from the protoplasm is more than regained by the energy set free by the decomposing substances. The result is seen in the germination of the embryo. For a time they lose weight through the loss of carbon and water, but, of course, rapidly increase in weight as soon as roots and green parts are produced.

As an illustration of respiration the following experiment may be mentioned. If a quantity of well moistened Peas be put in a closed glass jar in a warm place, they soon consume all the oxygen and replace it by carbonic acid. If, then, a lighted taper be quickly inserted it will go

out if enough carbonic acid be present. Or if a little lime water be poured in and well shaken it will become milky by the formation of carbonate of lime.

In order to extract the endosperm after the embryo has escaped from the seed-skin the tip of the cotyledon often remains within the seed while the greater part may have escaped and become green, as may be seen in the loop-like cotyledon of a germinating Onion. In the Cocoa-nut the embryo, which lies in the "plug" filling the one orifice in the shell, sends a globular cotyledon into the cavity. This by applying itself to the inner surface of the endosperm dissolves and consumes it.

If the food materials be in the cells of the cotyledons themselves, then these may remain below ground till all be consumed, as in acorns; or they may first surrender up their starch &c., and be raised above ground by the radicle, turn green, and perform true leaf-functions, as in Mustard.

In the case of Orchids, which have no endosperm and very little other reserve food, the germination is peculiar.

In the first place the cells of the "suspensor," or even of the globular pro-embryo itself (*Stanhopea*) elongate and branch, burrowing into the placentas to extract starch, which is transmitted to the pro-embryo. It has been found difficult to secure the germination of Orchids, but it has lately been discovered that to do so with success, the seeds require the presence of a minute fungus in the soil, which lives a symbiotic life with the germinating pro-embryo, supplying the latter with proper food in some way not yet understood; as occurs in the nodules on the roots of leguminous plants well known to contain microbes, which fix the nitrogen of the air and supply that important element to the plant. To secure an easy germination of any Orchid, therefore, the seed should be sown in the same soil as that in which a plant of the species has been growing; as it will have been impregnated with the particular microbe or fungus required by seeds of the same species of Orchid.

The first visible sign of growth is the protrusion of the radicle, which instantly turns downwards to form the true root at its apex. This downward growth is called "geotropism," a word which only means "a turning earthwards." This is presumed to be due to a sensitiveness or irritability of the protoplasm in the cells of the growing point, a space behind the immediate apex of about  $\frac{1}{2}$  to  $\frac{3}{4}$  of an inch; all behind it ceases to elongate. If a tap-root has been laid horizontally it soon begins to bend downwards: but the point of greatest curvature is higher up than the distance mentioned, showing that while experiments prove the irritability to reside in the growing part, the influence is conveyed up the root to a higher point, presumably by means of the continuity of the protoplasm from cell to cell.

When the primary root gives rise to secondary ones these are not influenced by gravity so much, as they deviate at various angles from the main root. If, however, the growing point of the latter be cut off, then one or more of the lateral ones begin to grow vertically downwards. This has been compared with the excision of a terminal shoot of a stem, when one or more lateral shoots immediately grow upwards vertically to take its place. It is due in both cases to a redistribution of sap which has been checked in its due course.

Another cause of incitement in the protoplasm of the root-tip is the presence of moisture. An experiment of Sachs illustrated this remarkably well. He grew some Beans in wet moss in a trough made of wire gauze. The radicles grew vertically downwards, as long as they were inside and equally moistured all round, but on escaping through the meshes the attraction of the moist moss was greater than that of gravity; so that the tip turned back and re-entered the trough, but by being now in the same condition as at first the radicle soon curved downwards again. On repeating the process it actually threaded its way in and out of the meshes of the gauze. The trough was suspended at a considerable angle so as to render the attraction of the water more evident.

The next movement to be noticed is the circumnutation of the radicle when elongating downwards. It consists of an approximately circular bowing motion, but may more correctly be described as an irregular wagging. This presumably enables the radicle to find the line of least resistance to its penetrating the soil. The root-hairs formed by the elongation of epidermal cells help to fix it by adhering to the particles of the soil, thus giving a greater purchase for penetration.

The strength of the growing root-tip was ascertained approximately by Darwin in the case of a Bean, to be sufficient to raise one-quarter of a pound in twenty-four hours. The root of another Bean was passed through a round hole in a piece of wood cleft to the end. The strength of the radicle exerted in opening the cleft was 8 lb. 8 oz. Only  $\frac{1}{4}$  inch was within the hole, and the root had really exerted a greater transverse strain, for it had split the solid wood for a length of rather more than a quarter of an inch.

Another discovery made by Darwin was that the root-tip is sensitive to pressure, and that if it be continuous the root turns away from the obstruction. He grew seeds in moist air and fixed a piece of card at one side of a root-tip. This then curled up on the opposite side, often forming a complete circle in so doing. Darwin observes that this is the only known instance of a vegetative organ avoiding and not turning round an object, as in climbing plants.

As soon as the radicle is well out of the seed-skin, the plumule may grow or be temporarily arrested. In the latter case the radicle comes above ground and forms the aerial stem and bears the two, now green cotyledons, as in Mustard.

If, however, the cotyledons remain below ground then the plumule rises at once, as in the Oak. The stem circumnutates as well as the radicle, and this assists it in freeing itself from the superincumbent soil; and if it be a stem-climber it utilises the power of circumnutation for twining up other plants.

The interpretation of the erect growth of stems is that it is due to light acting as an irritant, for plants are illuminated from above. If plants be grown from seed on a gauze shelf in an inverted box and illuminated only from below, then the shoots grow vertically downwards in the direction both of the light and gravity, showing that the first is the real cause, and not gravity, of erect growth.

The only effect of gravity upon a stem growing upwards is to make

it put on tissues capable of resisting the strain, or tendency to fall to the ground.

With regard to the duration of seed before germinating, it varies immensely: Wheat, for example, is particularly short-lived. Hence all stories of "Mummy Wheat" having germinated after being 3,000 to 5,000 years in the tombs of Egypt are absolutely untrustworthy. Not only have all experiments to make *genuine* Mummy Wheat grow invariably failed; but it is a common practice of the Arabs to sell fresh wheat rolled in Nile mud to give it the same mouse-colour of true Mummy Wheat. This, of course, readily grows.



## THE USES OF LEAVES.

SUBSTANCE OF A LECTURE AT CHRISWICK GARDENS.

By Rev. Prof. G. HENSLOW, M.A., V.M.H., &amp;c.

[July 10, 1900.]

To execute their functions properly leaves must be green. If they are otherwise coloured, as of *Coleus* and Copper-beech, then the green chlorophyll, though present, is obscured.

If they are yellow or white in places or variegated, such is usually an abnormal condition of things, and due to insufficient light or want of iron or other ingredient in the soil.

In the case of many parasitic plants, as Dodder, Broomrape, and Toothwort, these are greenless because, living on host-plants, they do not require any chlorophyll at all for assimilating purposes.

If one trace the changes undergone by protoplasm from an etiolated condition in darkness to a green one in light, it is found that the colourless protoplasm breaks up into pieces which become green by the action of light. The green colouring matter can be artificially extracted when the colourless protoplasmic granules remain.

A green leaf is thus prepared to perform two functions, viz. assimilation and transpiration, under the action of sunlight. To understand what takes place, a three-sided prism of glass is required to decompose a ray into the coloured spectrum; and if this is placed before a clear green solution of chlorophyll dissolved in spirits of wine, seven dark bands appear across it. One very black is in the red, three smaller and lighter to the right of the last in the orange and yellow, and three very broad and dark in the blue and violet end.

The meaning of this is that the light corresponding to the position of these bands is stopped and absorbed by the chlorophyll solution.

No bands occur in the green light; hence the green rays are not absorbed, but are either reflected from the surface of the leaf or transmitted through it. That is why leaves are green.

To find out which of the rays are specially concerned in these two functions various experiments have been made, as by growing plants under coloured glasses or coloured solutions. Unfortunately no glass, except perhaps a ruby red one, is "pure," in that they transmit the rays which give the colour, but the others are not entirely stopped. They are only obscured by the predominant colour, and so are invisible to the eye. The spectroscope, however, at once detects their presence. Hence all such experiments can only give approximate results.

Now it is found that although assimilation goes on more or less under all coloured glasses, they show certain *maxima* and *minima*. The best for assimilation are yellow and blue, while for transpiration, red, violet, and (feebly) green are the colours under which the greatest amount of water is given off. Hence it appears that the rays more especially concerned with these functions alternate with each other.\*

\* The reader is referred to my paper in *Journal of the Royal Horticultural Society*, vol. xvi., 1893, p. 59.

The different effects of the glasses are seen very obviously in the growth of the plants. Thus long weak stems are produced under red, yellow, and green glasses, but short ones under blue and violet. Again, the amount of water retained in the tissues, or its degree of succulency, is much greater under the red end of the spectrum than under the more refrangible rays.

The conclusion is that *all* coloured glasses are, separately, injurious to plants, the worst of all being green, as it arrests so much of the light right and left of it in the spectrum, which is absorbed by chlorophyll, *i.e.* just those rays which are mainly required for these two functions.

With regard to the results of assimilation the first process is the decomposition of carbonic acid ( $\text{CO}_2$ ) in the air by the green-coloured protoplasm of the chlorophyll granules. The various chemical substances formed in succession are not perfectly known, but the first *visible* product is starch. This appears as minute granules on the chlorophyll grains. They increase in size until the latter may disappear from view.

As soon as light has gone the starch is converted into sugar, and this, being soluble, can be conveyed away to the growing parts, there to furnish material for building up cell-tissue. If there is a superabundance at the end of the growing season, it is stored up as starch or oil in seeds, tubers, cellular parts of stems, &c., for future use.

It is worth while observing that no other known method exists in nature by which  $\text{CO}_2$  can be decomposed, than by protoplasmic chlorophyll granules; though  $\text{CO}_2$  is constantly being formed by respiration, combustion, and other chemical processes, and the oxygen of the air correspondingly utilised. This element, however, is restored to the atmosphere whenever  $\text{CO}_2$  is decomposed by the green parts of plants.

If a chemist wished to decompose  $\text{CO}_2$  he must find some substance with a more powerful affinity for oxygen than carbon. He therefore takes a piece of the metal sodium, placing this in a flask full of  $\text{CO}_2$  and applying heat from a lamp; for it will do nothing at an ordinary temperature. The sodium now seizes upon the oxygen, and forms caustic soda, while the carbon is set free as a black powder.

But the chemist can go no further. Chlorophyll granules decompose the  $\text{CO}_2$  without these violent chemical methods, and then instantly utilises the carbon set free by combining it with the elements of water; and so in time makes starch, the composition of which is  $\text{C}_6\text{H}_{10}\text{O}_5$ , *i.e.* really six atoms of carbon (C) united with five molecules of water ( $\text{H}_2\text{O}$ ). It has been thought that  $\text{CO}_2$  might be supplied to plants dissolved in water taken up by the roots, but all experiments give negative results. Indeed it would appear that no green part can decompose  $\text{CO}_2$  unless it be actually presented to it *directly* from the air. It cannot even be transmitted from one half of a leaf to the other half; for if a leaf be half under a bell-glass containing  $\text{CO}_2$  in the air, while the other half is under a glass in which there is none, it is only in the portion exposed to  $\text{CO}_2$  where starch will be found, though the whole is equally illuminated.

With regard to the other function, *viz.* transpiration, or the exhalation of superfluous water from the green parts of plants, this too is effected by the agency of special rays of the spectrum. The use of it is that the plant may imbibe sufficient mineral matters from the soil. As these are

usually in very small proportions—about 2 per cent.—a large amount of water has to be got rid of. It is therefore a true vital function, and unlike evaporation, which is due to heat and occurs with non-living substances.

As transpiration is the throwing off water absorbed by the roots, and principally under the influence of the red and violet rays, it has been thought that leaves could not absorb water. This, however, is practically refuted by all the experiences of florists, who invariably sprinkle the leaves of cut flowers to keep them fresh. Under ordinary circumstances when a plant is freely transpiring and has a good supply to draw upon in the soil, it has no need, nor is it capable of taking in any more than it can hold; so that experiments with such plants yield negative results. But a very striking proof that they can and do absorb water is easily seen if a number of cut shoots of various sorts of herbs and shrubs be made and left in the sun for two or three hours until they are flagging. Then they must be weighed and laid out on the ground during a dewy night. In the morning, if all the superficial moisture be carefully removed by a soft cloth, they should be again weighed, and they will be found to have gained enormously in weight. Moreover, they will have lost all their limp appearance and become as fresh-looking as when first cut off. Hence, although they may refuse to absorb water when in full vigour, they readily do so as soon as transpiration has exceeded the supply by absorption by the roots.

Last comes the fall of the leaf. When leaves have done their work for the season they fall off. If in one year the trees are called deciduous. But if they remain on for a longer period they are called evergreens. The process is as follows. First, everything that can be of use to the plant is withdrawn from the leaf, the chlorophyll decomposes and passes into compounds of tannin, becoming yellow and brown. The protoplasm undergoes "fatty degeneration," passing into oil &c., after yielding up its nitrogenous materials. Nothing but what is useless, such as the skeleton &c., is left behind. Then is formed the "absciss" layer of cells which cuts the base of the leaf-stalk across, and a puff of wind is sufficient to detach it.

This so-called absciss-layer is really nothing more than a continuation of the cork-forming layer of the stem. This is constantly being formed all over the stem of the tree. But on the first year's twig, which carries the leaves of the year, it is intercepted at first where the leaf-stalk issues from the twig; for the woody bundles, liber, &c. are in continuation from the twig into the leaf-stalk. But by the end of the season the "phellogen," as the active bark-layer is called, invades the region whence the stalk proceeds and gradually cuts off the vascular connection between the stalk and the twig.

Having thus thrown off the leaf the phellogen continues to cover the stem below the cicatrix with cork, which soon obliterates all trace of the spot where the leaf was inserted.

## LILIES.

By Mr. R. W. WALLACE.

[Read July 17, 1900.]

ALL of us from our infancy have been acquainted with the Lily in some form or other; and, I suppose, there are few plants that have such an ancient history, as we find them mentioned by writers in all times. The genus *Lilium*, according to Maund, was founded on *Lilium chalcedonicum* (fig. 8), and I think it will be of interest if I read what he says ("Botanic Garden," vol. iv. p. 292):—" 'Leios,' signifying 'well polished,' is supposed to have been the original word on which the Greeks founded their appellation *leirion*, and hence our *Lilium*; a term used by us, as its original was formerly by the Greeks, to designate a tribe of magnificent plants; but it is probable that their name took a much wider range over the produce of the East than in these days of scientific acumen is permitted to our *Lilium*. This old favourite was known in our gardens

FIG. 8.—*L. CHALCEDONICUM*.

before the days of Gerard, and, as he calls it the Red Lily of Constantinople, it may be presumed that it was brought thence to England. In all ages man has sought for natural objects of beauty, and it may be questioned whether, as far as circumstances would admit, equal zeal in collecting plants did not exist three centuries ago as at the present day."

I cannot say whether the above statements are quite correct, but there is no doubt about a fine spike of *Lilium chalcedonicum* conveying to the mind the idea of being well polished.

Much might be said about the history of the Lily and the admiration expressed by many old writers for its stately beauty and grace; but this, I fear, would be of little practical interest.

*Lilies*, as we all know, are found in many countries; but they belong exclusively to the southern portion of the continents of Europe, Asia, and America, their presence on the latter being limited to the southern half

of North America. Of these three regions Asia has the greatest number of species; Europe the next; America, if we take into consideration its vast extent of surface in relation to the number of species found thereon, ranks last.

Thus you see the Lily is almost a world-wide plant, therefore of necessity found in all soils and situations. Speaking broadly, I should say that Asia has given us our finest and most magnificent species; North America next; and Europe last; and that, as a general rule, the European species are most amenable to cultivation in our gardens, North American



FIG. 9.—*L. BROWNI*.

species next, and Asiatic last. With the exception of a few Indian species, all Lilies are hardy in our climate, a late spring frost doing infinitely more damage to them when in growth than a very severe winter. I would lay special stress on the fact of Lilies being hardy: one so often comes across the individual who can hardly credit the fact that such Lilies as *Browni* (fig. 9), *Hansonii*, *Giganteum* (fig. 25), *Longiflorum* (fig. 10), *Henryi* (fig. 11), *Martagon Album* (fig. 20), &c., can be cultivated with success in the open border.

About twenty-five years ago Professor Baker took the Lilies in hand, arranged and classified them in a systematic order, and worked out a

synopsis of the whole genus upon lines which all can understand, dividing them into the following five groups:—

1. *Cardiocrinum*: Perianth funnel-shaped, leaves stalked, heart-shaped; contains only two species—*Cordifolium* (fig. 12) and *Giganteum* (fig. 20).

2. *Eulirion*: Flowers funnel- or trumpet-shaped, large, more or less white in colour; typical species—*Longiflorum*, *Candidum* (fig. 13), *Washingtonianum* (fig. 14), *Browni*, *Parryi*, *Odorum*.

3. *Archelirion*: Flowers large, open, and spreading, comprising some of the finest and most attractive; typical species—*Auratum* (fig. 16), *Speciosum* (fig. 17), *Tigrinum* (fig. 18).



FIG. 10. *LONGIFLORUM WILSONI*.

4. *Isolirion*. Flowers erect and cup-shaped; typical species—*Concolor* (fig. 19), *Croceum*, *Elegans*, and *Umbellatum*.

5. *Martagon*: This group, in which the petals are more or less reflexed, includes the well-known tribe of Turk's Cap Lilies, also the numerous and beautiful North American group. (Fig. 26).

Full particulars of this synopsis will be found in the *Gardeners' Chronicle and Garden* for 1875. And I would advise all those interested in Lilies, who have not at present read this valuable contribution, to do so as soon as possible.

Lilies are found growing in many countries and different positions; it follows, therefore, that to obtain success with them we must as far as possible imitate these conditions. On the whole I think Lilies may be

classed as woodland plants, more especially those of North America and Japan : in the former country they are found growing in large open glades and on wooded hillsides, the undergrowth protecting them from cold winds and early frosts, and the trees during the summer screening them from the hot sun and giving that coolness and partial shade that they so delight in.

In Japan Lilies are found growing on the sides of wooded hills and slopes, established in pockets of rich soil washed down from the hills, and



FIG. 11 --*L. HENRYI*.

generally near small streams. From all that can be ascertained I think there is no doubt but that Lilies succeed best in this country when planted in partial shade and surrounded with a cool, moist atmosphere ; but they must not be planted directly under trees nor in total shade. The Lily requires some sun, but not the hot midday sun. An ideal spot for Lilies would be an open forest glade with a small stream running through it, near the banks of which the N. American peat and moisture-loving Lilies would flourish ; and higher up, away from the water, clumps

of *Auratum*, *Washingtonianum*, *Humboldtii* (fig. 21), *Giganteum*, and all our finest species, would readily grow.

It is difficult to lay down hard-and-fast rules as to the proper positions in which to plant Lilies, as the same variety may be seen flourishing equally well under totally different conditions; but I would recommend intending planters to avoid positions exposed to cold sweeping winds. Never plant directly underneath trees, but if possible at some little distance away; the trees will then give them the required shade. Nor in a hot dry corner, or in a cold wet heavy soil, or where the soil is water-logged; if planted near a lake or a large expanse of water, the young growths will need protection from late spring frosts. *L. Henryi*, *Auratum*, *Longiflorum*, *Speciosum*, are specially liable to injury from this cause. In *Rhododendron* beds and amongst low growing shrubs they always do well, and in no position do they show up so effectively as when backed by the rich deep green leaves of the shrubbery. The beds at Kew near the Palm House are excellent examples of this



FIG. 12. *L. cordifolium*.

mode of culture. Therefore in a few words, and at the risk of repeating myself, the best positions for Lilies are those that afford partial shade, protection from spring frosts and hot midday sun, and that give coolness and moisture at the root.

Having found the right position for Lilies, the next thing is to see that we give them the best and most suitable soil for their requirements. One can generally do this, even if an ideal position is not to be found. The different soils suitable for successful cultivation I have divided roughly into three classes:—

*First*, any good garden soil of a fair depth, well dug before planting, is suitable for such good growing kinds as *Browni*, *Candidum*, *Chalcedonicum*, *Croceum*, *Excelsum* (fig. 22), *Hansoni*, *Henryi*, *Martagon* (purple), *Pyrenaicum*, *Thunbergianum*, *Tigrinum*, and *Umbellatum*: these will all flourish in any good border soil with fair treatment.

*Secondly*, lilies that prefer a strong soil, such as a good rich friable loam, not too heavy, viz. *Auratum platyphyllum*, *Batemaniae*, *Columbianum*, *Humboldtii*, *Humboldtii Magnificum*, *Martagon Album*, *Dalmaticum*, *Pom-*

ponium verum, Rubescens, Speciosum, Szovitzianum, Washingtonianum, and Wallichianum Superbum. (Fig. 23.)

Thirdly, we come to those that require peat and moisture, viz. Burbanki, Canadense (fig. 27), Grayi, Pardalinum, Parryi, Philadelphicum, Roeszlii Superbum.

The above lists represent, in my opinion, those Lilies which can be grown with little trouble.

Those in the first list will succeed in any ordinary border under conditions inferior to those already described as essential for perfect cultivation.



FIG. 13.—LILIUM CANDIDUM.

Those in the second list require a certain amount of partial shade, and coolness at the root, and are suitable for planting in Rhododendron beds and amongst low growing shrubs.

Finally, the third group comprises those that require a cool shady spot, such as the edge of a pond or stream, or in a woodland glade.

In addition to the species mentioned, there are a great number which are capable of successful cultivation with a little extra care, varieties which to an enthusiast would be indispensable.

Having found the right position and soil, the next step is to see about planting the bulbs, and at what time this is best done.

On this point great divergence of opinion exists among the general

public (I am not now speaking of Lily enthusiasts). In fact, I should say more Lilies are planted in the spring months than in the autumn; whereas it is plain to all those who look into the matter that autumn is the best time to plant most of the species. A Lily when in full growth



FIG. 14.—*L. WASHINGTONIANUM*

is performing two functions—one developing, by means of its stem, the flowers, and the other, by means of its basal roots, the bulb for next year's growth—so that it requires as much attention to its wants below the ground as above. All Lilies do not have similar root action: there are two classes. First, those that make two sets of roots, one from the base





FIG. 15.—*LILIVM ALEXANDRINUM*.

(To face page 104.)





of the bulb, the other from the bottom of the flower stem. Second, the Lily that only produces roots from the base of the bulbs.

Now it is obvious which Lily requires early planting and which Lily can be planted late with reasonable hope of success. Those Lilies that have only basal roots to depend upon must be well established before they can flower with any degree of success; as, unless they are well rooted, the stem has nothing to draw from and feed on, except the bulb, which



FIG. 16.—*L. auratum*.

naturally suffers. Whereas those that have two root actions may be planted almost at any time; for as soon as the stem is about 6 inches high, roots may be observed breaking out in small rings round the base of it, which grow with exceeding vigour, and help and support the stem to produce its flowers almost independently of the bulb. I have often noticed when lifting *L. auratum* that those bulbs which had plenty of basal roots had new well-formed bulb growth; whereas, when it was

absent, the bulb had flowered by means of the stem roots and then collapsed.

*Lilium Martagon* and its vars. *Chalcedonicum*, *Szovitzianum*, *Dahnaticum*, *Humboldti*, and others of a similar character, only produce basal roots. The root action commences about the middle of October or earlier,



FIG. 17.—*L. SPECIOSUM*.



FIG. 18.—*TIGRINUM FORTUNEI*.

and continues during the winter. Therefore, if it is necessary to lift the bulbs, it is best to do so before root action takes place; for if the bulb be lifted after root action has commenced, and the roots damaged or dried, it receives a serious check, and will only produce a weak growth.

I lift my bulbs early, and keep them cool and moist in cocoa fibre, and plant them again not later than December, when root action at once commences, and not much time is lost. And I think that there is not



FIG. 19.—*L. CONCOLOR*.



FIG. 20.—*L. MARTAGON*.

much doubt that the late planting of *Martagon* Lilies, and after root action has been checked, is the cause of their partial failure the first season. Species with two root actions, like *Umbellatum*, *Thunbergianum*, *Browni*, *Batemanniae*, *Longiflorum*, *Speciosum*, *Tigrinum*, *Henryi*, *Odorum*, *Krameri* (fig. 24), &c., do not make such stout basal roots, and do not re

quire such care when being lifted; nor is it necessary to lift them so early; and they can be planted any time during the autumn and spring without experiencing any serious check.

The stem roots of these Lilies are, so to speak, the mainspring of the flower stem, forming a dense mat or wig round the stem, and enable it to draw its nourishment independently of the bulb. It is very important that they should be kept cool and moist (especially is this so in pot culture); for if they once get thoroughly dry or scorched by the sun, the stem at once suffers, the leaves turn yellow, drop off, and often the whole plant succumbs. This is very often the cause of failure in *L. auratum*, which more than any other Lily likes coolness at the root. For trade purposes it is always best to lift all Lilies as soon as growth is finished and keep them cool and fresh in a shed or frame: by this means root action is held in check.

Good, sound imported bulbs of Japanese Lilies, which now arrive in excellent condition during the early part of the year, may be planted



FIG 21 *L. HUMBOLDTII.*

as late as March and April with every confidence as to the result, provided they are in a fresh and sound condition for planting when received.

As a general rule, when planting bulbs, they should be put in the soil about three times their own depth: the soil should be well dug, and it is beneficial if a little peat, turfy loam, leaf soil, and sea sand be added. This latter (the sea sand) should be placed all round the bulbs; in fact, we use sea sand to a very large extent, generally covering the bulb entirely with it. It is always moist, and being of a gritty nature prevents the attacks of slugs and grubs, and also keeps the soil from setting fast round the bulbs.

I would recommend, when planting Lilies amongst Rhododendrons and shrubs, the using of old tubs cut in half, with the bottoms knocked out. They can be sunk in the beds and filled with a good mixture of soil, and will serve to keep the roots of the shrubs and trees from interfering with the bulbs. Lilies planted in this manner are generally very successful. A little well decayed manure—cow manure for preference—may be worked in beneath the bulbs when planting, but it must not be

used too freely. When the bulbs are planted, the surface of the soil may be covered to a depth of 3 inches with ashes : this serves as a protection in winter. I do not like cocoa fibre, as it holds moisture and attracts frost.

*Lilium Giganteum*.—This grand Lily (fig. 25) has attracted much attention of late by reason of the splendid figures that have appeared in the horticultural press, and also the fine illustration in Miss Jekyll's book ; therefore a few remarks on this, the most majestic of all Lilies, may not be out of place. It delights in a deep rich vegetable soil, and should be planted where it has protection from wind and sun. It is, perhaps more



FIG. 22. — *LILIUM EXCELSUM*.

than any other Lily, specially suited for the woodland. I do not believe that anything is gained by the planting of the extra large flowering bulbs. I think it is better to obtain smaller bulbs, and let them thoroughly establish themselves for a year or two, and then they will throw up their lofty flower-stems in full beauty.

It is obvious that, when a bulb of this Lily flowers the season after planting, it can have nothing like the root action to draw from, which a bulb, that has been in the ground for some years, has.

As pot plants for conservatory decoration, Lilies are unequalled, producing, when well grown, quantities of large well-formed flowers. The following varieties are most suitable for this purpose :—

Auratum and its varieties.  
 Speciosum     "     "  
 Longiflorum.  
 Hansoni.

Excelsum.  
 Umbellatum.  
 Candidum.  
 Henryi.

Wallichianum Superbum.

The bulbs should be placed in pots about two and a half times their diameter and  $\frac{1}{2}$  in. below the surface of the soil. Good turfy loam, peat, and sand make an excellent compost. Plunge the pots in ashes outside under a wall, or in a cold frame; and as soon as root action has wel



FIG. 23.-- LILIUM WALLICHIANUM SUPERBUM.

commenced, take them into the greenhouse as required. When the bulbs are well rooted, care must be exercised in watering; for as the pots are full of roots, if once they get dry, serious damage is quickly done. Give auratum plenty of shade and moisture; the variety platyphyllum is a noble pot plant, and very reliable. After flowering they should be plunged outside in a cool shady border; and when the foliage has quite died down, they should then be stored for the winter in a cool frame or outhouse. In early spring they should be gone over, and fresh soil added and renewed.

Another method of cultivating Lilies under glass is that adopted by Mr. G. F. Wilson, of Weybridge viz. growing the plants in pots in a cold

unheated greenhouse. In this way nearly all known varieties can be grown successfully. Protected from wind and wet the flowers are produced in a state of perfect beauty, and, if required, taken 'into the house



FIG. 24.--*L. KRAMERI*.

without cutting the flower stems. And here I may say that one should be careful in cutting Lilies, not taking more of the stem than is absolutely necessary, as the more stem you leave the better the new bulb growth.

Not much improvement has been effected by the hybridisation of Lilies of late years, or, in fact, at any time. Numbers of seedling



FIG. 25.--*L. GIGANTEUM*.

Lilies have been raised, but as a general rule they are defective and inferior. They do not readily cross with each other. The Martagons are responsible for most of the hybrids we have.

*L. Dalhansoni* (fig. 26) and *Marhan* are two good additions, but still not superior to either parent. *Lilium Excelsum* or *Testaceum* is said to be a hybrid between *Chalcedonicum* and *Candidum*, raised by the late M. van Houtte. This is decidedly an addition to our gardens. It is rather curious, considering what an advance has been made in the improvement of so many plants, that the Lily should stand to-day practically the same as when first discovered in a wild state. It almost seems as if nature was satisfied with her own work, and refused to have it improved by man. I believe that Mr. Luther Burbank, of California, has been experimenting in a large way in Lily hybridisation, and perhaps shortly we shall have



FIG. 26.—*L. DALHANSONI* (*HANSONI* × *DALMATIUM*).

*This Illustration is typical of the growth of all Martagon Lilies.*

some startling developments. Nor have any great number of new Lilies been introduced to cultivation of late years, as compared with twenty years back ; but amongst new introductions *L. Henryi*, I think, stands first. This has proved to be a thoroughly good doer under all conditions. *L. Wallichianum Superbum* or *Ochroleucum* from Burmah is another grand Lily, perfectly hardy. *L. Lowi*, also from Burmah, has a good constitution. *L. Rubellum* is very distinct and pretty ; but I must say it so far has been, on the whole, disappointing. Dr. Henry, in addition to his namesake, has found several new Lilies, some of which, in the way of *Browni*, have been flowered at Kew, and are spoken of very highly. I also hear of two, if not three, distinct new species from California. So, thanks to plant

lovers and collectors, the genus is gradually being added to and increased.

During the last fifteen years Lilies have been very plentiful in comparison with twenty years ago, hundreds of thousands reaching this

FIG. 27. *L. CANADENSE*.FIG. 28. *L. TENUIFOLIUM*.

country every year from Japan and Bermuda, to say nothing of the thousands that are shipped to America. As a natural consequence bulbs, which twenty-five years ago used to make from one guinea to five guineas each, can now be bought at a shilling to 5s. each. I think one hardly realises what an enormous trade has so quickly grown up in the special cultivation of Lilies suitable for forcing, such as that which has been carried on during the last ten years in Japan and Bermuda. From the latter place I suppose that at least one or two million bulbs are annually exported, which would be worth about £15,000. Then from Japan, that

FIG. 29. *L. SUPERBUM*.FIG. 30.—*L. NEILGHERENSE*.

marvellous Lily country, some four or five million bulbs of *L. longiflorum* were exported last year: they would be worth fully £25,000 or more. Then what becomes of the bulbs? They are nearly all forced for the various flower markets during the spring and early summer, Easter

being the great market time. One large grower for Covent Garden told me he cut 1,400 dozen blooms during one Easter week.

Then, again, think of the hundreds of thousands of *Auratum*, *Speciosum*, and others, annually exported from Japan; also the many thousands of North American Lilies sent to Europe. Now see what a vast trade has sprung up: not only are hundreds employed in raising and exporting the bulbs, but a still greater number in forcing and selling them; and as a consequence tens of thousands throughout the world have been enabled to beautify their homes at a slight cost with these—some of nature's fairest flowers. And am I not justified in saying that any undertaking, which causes in a right manner the distribution of large sums of money all over the world, cannot fail to benefit the human race? Therefore I think the Lily, as much as, if not more than, any other plant, has played its part in the horticultural history of the world.

I should like to refer to the discussion on Lilies initiated by Miss Jekyll and now taking place in the *Garden* newspaper. The result is bound to be of great value, as the various opinions, when classified, will certainly be a practical guide both to the amateur and professional; and I think we are all indebted to those enthusiastic cultivators who, like Mr. Wilson and Miss Willmott, show us in their gardens what is possible in regard to Lily cultivation.

In conclusion let me urge on all who love the beautiful in nature to try and cultivate the Lily. We are bound to have our disappointments and failures; but these should only determine us to try again: and when we do have success, we are amply repaid for all our trouble. For what flower can compare with the stately habit and noble outline of the Lily? And what are more effective in the garden than the various fine forms, well established, standing out in all their graceful beauty against the dark background of tree and shrub?

In attempting to speak on a subject which has so wide a range, I have felt my inability to do it justice, and know that I must have left out much of importance and interest. But if there is anything which I have not made quite clear, I shall be pleased to explain it, as far as I am able to do so.



## CHERRIES AND PLUMS IN POTS.

By Mr. H. SOMERS RIVERS.

[Read July 31, 1900.]

IN a most interesting book, bearing the date 1653, entitled "A Treatise of Fruit Trees," by R. A. Austen, the author is at great pains to prove why fruit should be grown. Many of his reasons are such as can hardly be read to polite ears of two and a half centuries later, but one of the very numerous "Arguments of the Dignity of Fruit Trees and Art of Planting" appeals to most of us strongly, especially with Cherry orchards. "It is pleasure to the Ear to heare the sweet notes and tunes of singing Birds, whose company a man shall be sure to have in an Orchard, which is more pleasant there, then elsewhere, because of other concurrent pleasures there." Perhaps in those days the birds had not acquired such a taste for fruit. I believe that not so very many years ago starlings did not touch Cherries; now, if it were not for the orchard house, we should have very few ripe Cherries at Sawbridgeworth. Directly the first tinge of red appears there is a rush on the part of the birds: rooks, starlings, thrushes, and others make away with the fruit as fast as they can, and apparently without any regard for their digestions. An orchard house is the only safeguard against them: with double doors, the inner of half-inch mesh wire-netting and with the ventilators wired over with the same, we can ripen crops of such Cherries as it is impossible to grow outside. When ripe they will hang for three weeks or more on the trees, secure from feathered depredators. The most convenient orchard house is a span roof 24 feet wide, 4½ feet high at the eaves, and 12 feet to the ridge. Ventilators 18 inches wide, hinged at the bottom, run round the sides; the top ventilators are 3 feet wide by 15 inches, 7½ feet apart, on alternate sides of the ridge. We used to fruit our Cherries in a smaller house, 14 feet wide and 9 feet to the ridge. This scarcely allowed sufficient head room for the large trees, many of them fifteen years old. Certainly they seem grateful for the increased breathing space. As soon as their crops are finished the trees are taken out of the house and plunged nearly up to the pot-rims in a border outside. The reason for plunging is two-fold: first, the earth which envelops them keeps the pots and their contents moist and renders the labour of watering less heavy; and secondly, the somewhat top-heavy trees are thus in no danger of being blown over. Water must be given to the trees during dry weather, and occasional good syringing helps to keep them clean and healthy. In October the trees should again be brought into the orchard house for repotting, before which process they must be under cover for a time, so that the earth in the pots shall not be sodden. This also applies to the earth to be used for repotting, a good loam with which is mixed rotten manure in the proportion of one load to two, and also broken-up mortar rubble, a barrow-load to a load. In repotting, the outer soil, filled with fibrous rootlets, is scraped away, leaving a ball of earth containing the larger roots; the tree is replaced in the pot, and the new soil rammed in firmly and evenly nearly

up to the rim. The surface is at the same level round the trunk as before. Thorough repotting need only be done alternate years. In intermediate years the outer soil can be removed nearly down to the bottom of the pot and replaced by fresh without taking out the tree. A good drainage, very necessary with Cherries, is provided for by a layer of crocks at the bottom of the pot. In repotting the tree must not be moved into too large a pot: an 11-inch pot is ample for a three-year-old tree, which may be given one size larger at each repotting if necessary; an 18-inch pot will contain the largest tree. When this operation is finished the trees are stood as close together as possible, in single rows in the house, in one end of which is heaped sufficient Barley straw to pack round and over the pots, making a layer of about a foot deep, when there is severe frost, and the trees are snug for the winter. Water must be given until the leaves are all fallen. From about the middle of November to the end of December the trees will require none at all. If January be mild they should have some water again, and from then onwards occasionally when necessary. Towards the end of February they must be pruned—an operation rendered quite unnecessary in some cases, where the older trees in full bearing make no new shoots. The last year's growths must be cut back to about five eyes; with very strong shoots, or, in the case of strong growers, eight to ten eyes may be left. Water will now be wanted about once a week. The pruning finished, the house should be set out, *i.e.* the trees placed in their permanent positions for the summer; and this should be done symmetrically and carefully, as it makes all the difference in the appearance of the house. A centre border,  $5\frac{1}{2}$  feet wide, takes two rows of trees; a path 3 feet wide runs round it, leaving side borders  $5\frac{1}{2}$  feet wide. The floor of the house is firm and solid, never being stirred, and the path is rammed gravel and clay. A thin layer of fine cinders over the surface of the borders gives them a neat appearance and is kept raked and clean. The pots may be plunged in the borders up to about three inches of their rims, a bed of large cinders being placed in the bottom of each hole to allow the water to drain efficiently. The trees should be grouped with regard to the colour of their fruit. A good smoking with tobacco paper now will lessen the number of aphides hereafter, the trees being syringed thoroughly the next morning. About the middle of March the trees are a mass of white blossom, and are wonderfully beautiful: this gives place to dinginess for a time when the blooms are dead. The calyx remains round the swelling fruit for a long time and must be removed, as also the scales at the base of the fruit stalks, which, although they fall off eventually, persist until the fruit is nearly developed, if suffered to do so, and harbour insects &c. The thinning of the fruits should be done when stoning is finished, and all those fruits which are not going to swell can be detected. Ample room must be allowed to each berry, so that the fruits shall not be overcrowded when ripe. The bunches will have ultimately from six to sixteen or twenty fruits. During flowering all the ventilation possible must be given except when there are cutting winds; a single hot-water pipe running round the house will keep out the frost if necessary. Water will not be required in large quantity, sufficient being given to prevent the earth from becoming over-dry. When the foliage is coming out, and from then onward, water must

be given more frequently according to the weather. The amount of water the individual trees require may be easily ascertained by tapping the pot, which will give quite a bell-like note if the earth be dry. When watering the borders and paths should be thoroughly damped down to ensure moisture in the air. The trees must be syringed morning and evening until the fruit begins to colour, after which syringing should be discontinued, or the fruit will crack. Liquid manure or soot water should be given twice a week after stoning; and as there is so little earth in the pot compared to the crop it ripens, additional food must be given in the shape of a top-dressing of equal parts of kilndust and horse-droppings mixed, making a layer of about 2 inches thick near the rim of the pot, sloping down to the stem so as to form a basin to hold the water. Two top-dressings will be necessary: the first when the fruits are stoning, the second when they are colouring, by which time the goodness of the first application will be exhausted. When the young shoots have made a dozen or so good leaves they should be pinched back to eight or ten. One pinching alone is necessary, subsequent growths being left alone. The worst insect enemy to contend with is the black fly, but it may be kept down by watchfulness. The first smoking, with tobacco paper, referred to above, will do much; subsequently the trees may be smoked at any period with the patent vaporising compounds now sold. XL ALL may be used with perfect safety, even during flowering. There are many good Cherries well adopted to pot work when budded on the Mahaleb. Though it is a mistake to have too many varieties, several are needed to cover all the season, and it is very pleasant when one has been feasting on luscious Geans to give the palate a change by eating some crisp Bigarreus or acidulous Dukes. About the third week in June 'Belle d'Orléans' and 'Guigne Annonay' are ripe, the former light red, the latter black, both excellent Cherries and good croppers, though the fruit is somewhat small and that of the latter soon becomes dull after ripening. 'Werder's Early Black' ripens next: the fruit of this sort also soon loses its lustre, and it is scarcely worth growing, since 'Early Rivers' ripens almost at the same time. 'Early Rivers' is an ideal pot Cherry, bearing its large black fruits abundantly: they are of excellent flavour and hang on the tree a month after ripening, perfectly sound and bright to the last. 'Black Circassian,' 'Bigarreau de Schreken,' and 'Bedford Prolific,' three good black Cherries, follow.

In July we have 'Bigarreau Noir de Guben'; 'Governor Wood,' an excellent pale-red Cherry, which is, however, very liable to crack if water touches the ripening fruit; 'Belle de Choisy,' a fine Duke; 'Frogmore Bigarreau,' red; 'May Duke'; 'Elton,' a handsome bright-red Bigarreau; 'White Bigarreau,' with waxen yellow fruit slightly tinged with red next the sun; 'Turkey Black Heart,' a fine pot Cherry with firm, juicy fruit; 'Reine Hortense,' a large Duke; 'Monstreuse de Mezel,' a very large dark-red Bigarreau; 'Bigarreau Napoléon,' deep red; 'Black Hawk'; and 'Emperor Francis,' a very large bright-red Bigarreau.

In August ripen 'Late Duke'; 'Large Black Bigarreau'; 'Guigne de Winkler,' bright-red; 'Late Black Bigarreau'; and last, but not by any means least, 'Géant d'Hédelfinger,' a brownish-black Cherry of immense size with very firm flesh.

The directions given for the culture of Cherries may also be employed successfully with Plums ; but different species of fruits should, if possible, be grown in separate houses or compartments to avoid their requirements clashing at any time. As with Cherries, many Plums will hang on the tree under glass for a very long time, especially the late sorts: they shrivel slightly and become bags of honey. The bloom on the fruit is very strongly developed under glass, and is quite firmly fixed, not being easily rubbed off. An ample selection may be made from the following sorts: 'Stint,' the earliest, a pretty yellow Plum mottled with red, which must be picked directly it is ripe; 'Early Prolific' (or 'Early Rivers'), a round deep bluish-purple Plum; 'Czar,' large, oval, reddish-purple; 'Mallard,' deep purple; 'Oullin's Golden Gage,' very large, oval, rich yellow; 'Denniston's Superb, Early Transparent' and 'McLaughlin's,' all fine Gages of a greenish-yellow colour blotched with purple and red; 'Jefferson,' golden yellow spotted with red; 'Kirke's,' roundish, dark purple, covered with a heavy blue bloom; 'Belgian Purple,' a round dark purple Plum; 'Golden Transparent,' described by its name; 'Late Transparent,' purple, the leaves of which have a curious habit of curling inwards to the midrib, and thus exposing their under surface when the fruit ripens (this must not be mistaken for want of water); 'Coe's Golden Drop,' oval with a short neck, a yellow Plum with dark red spots; and 'Decaisne,' large oval skin, bright yellow, with a dense green grey bloom, both of which hang especially well; 'Reine Claude de Comte Athens,' a large red Gage which does not hang long; 'Monarch,' a very large purple Plum; 'Reine Claude de Bavay,' a late Greengage; 'Grand Duke,' an oval purple Plum which carries an extremely heavy silver-blue bloom; 'Primate,' very large, bright purplish-red; and 'Rivers' Late Orange,' of a glowing yellow orange colour. The flavours are very diverse and pleasing. they seem to be enhanced and at the same time refined by the additional sun and warmth under glass. Trees studded with their different coloured fruit make an orchard house quite as beautiful as is a conservatory of flowers. The Japanese Plums, so largely grown now in America, but which cannot be called a success with us in the open, I thought at one time would prove an acquisition in the orchard house, but they are not. Perhaps we have yet to discover the secret of their culture.

With both Cherries and Plums the glass should be shaded by syringing with whitewash when the fruit is ripe. The direct rays of the sun are too scorching if the summer be hot.



## MELONS.

By Mr. A. PETTIGREW.

[Read August 14, 1900.]

THE Melon (*Cucumis Melo*), Loudon tells us, "has been cultivated in England since 1570; but the precise time of its introduction and the native country of the plant are both unknown."

The Melon is highly appreciated as a dessert fruit by those who can afford it during the summer and autumn months. But owing to the expense incurred in its cultivation it is seldom seen on the tables of any but the rich and well-to-do people in this country.

Some fifty or sixty years ago Melons were grown entirely in pits heated by decomposing stable litter, leaves of trees, and spent bark from the tanyard, and in frames placed on hot-beds of these materials. This entailed a great amount of labour in making and in keeping the heat up to the proper temperature by adding linings of hot litter to the sides of the beds when the heat declined. But since the advent of cheap glass, and the introduction of the system of heating houses by means of hot water in pipes, and a better style of gardening architecture, the hot-bed system of growing Melons has almost disappeared from our gardens.

My first experience in making a hot-bed for Melons takes me back more than fifty years. It was then considered an important matter to be able to make a good hot-bed which would maintain the heat till the crop of fruit was ripened. In making the bed the litter, leaves, and bark (as the case may be) were collected in large heaps close to where the bed was to be made. After they had begun to heat they were turned over several times at intervals of a few days to allow the rank steam to escape, and the heat to mellow down to the desired temperature before making the bed. The heat was ascertained by means of trial stakes thrust into the heaps, where they remained until the materials were in proper condition to put together. The stakes were pulled out daily, and the heat gauged by the feel of the hand. I do not remember ever seeing a thermometer used for that purpose. The bed, which had generally a southern exposure, was made from 2 to 3 feet wider than the frame on all sides, and was raised to the height of 4 feet at the back and 3 feet in the front, so that when the frame was placed on it it would slope gently to the front. Stable litter was used to form the sides to make them firm and strong, and the leaves, litter, and bark were put in the interior of the bed. Sometimes these were kept separate and put on in layers, and sometimes they were mixed all together.

As the building of the bed proceeded the materials were shaken out, and spread evenly over the surface, and trodden at short intervals to guard against the bed settling down more in one place than in another when it was finished and the frame placed on it. To prevent the heat from rising too rapidly at first and injuring the roots of the young plants, a few turves with the grass side down were placed in the centre of each light, and small mounds of earth—loam and leaf-mould—were placed on

the turves, and when these were warmed to the proper temperature the plants were set out—sometimes one plant and sometimes two in a light. The bed was not earthed all over at once, but by degrees, as the plants grew, to the depth of a foot or more. As soon as the plants had made four leaves beyond the cotyledons the tops were pinched out to make

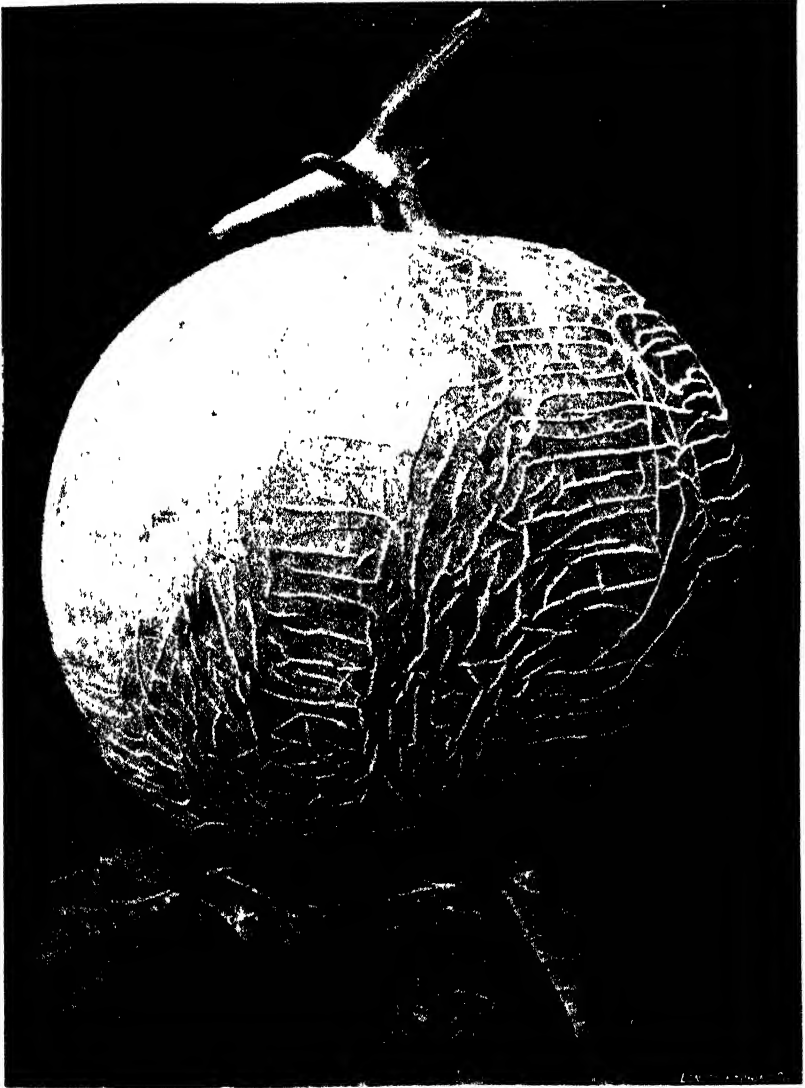


FIG. 31.—MELON 'HERO OF LOCKYNGE.'

them branch out and cover the bed. The leading shoots were allowed to grow to near the top and bottom of the frame before being stopped, and the lateral shoots from them were stopped a few leaves beyond the fruit, trained, and thinned out as occasion required. Care was taken that the female flowers were fertilised when perfectly dry, and as early in

the season as possible, when a sufficient number were open at the same time to secure a crop.

Soon after the fruit began to swell they were placed on pieces of slate, or inverted flower-pots, to keep them off the damp earth, and to expose them to as much light and air as possible. The cultivation after this consisted chiefly in watering the beds, giving air to the pits or frames, and keeping the temperature as near 70° as possible at all times, allowing a rise of 10° or 15° with sun-heat during bright weather, syringing the plants with tepid water early in the afternoon, and closing the lights immediately after to secure as much sun-heat as possible. As the fruits advanced towards maturity less water was given to the plants, and in some cases it was withheld altogether. This was done with the idea that drying off the plants would impart flavour to the fruits. One can scarcely credit intelligent men practising a system so repugnant to nature. I think no one ever dries off the plants now to impart flavour to the fruits. On the contrary, they try if possible to keep the foliage good, and the plants clean and healthy to the last.

The above are some of my recollections of the hot-bed system in growing Melons fifty years ago.

Melons are now generally grown in houses—span-roofed or lean-to—and the plants trained on trellises near the glass. Of the two structures I prefer a span-roofed house of the following dimensions to any other for growing Melons. Width from out to out, 12 ft.; height, 11 ft.; width of inside borders round the sides, 2 ft. 6 in.; depth, 1 ft. 3 in.; with chambers underneath covered with slate slabs, and two rows of 4-inch hot-water pipes in them for bottom heat, and two rows of 4-inch pipes on either side of the path for atmospheric heat. This will be sufficient piping to maintain a temperature of 70 deg. in all states of the weather. The outside walls 9-inch brickwork, and 4 ft. 6 in. above the ground level. The retaining walls of the inside borders single brick on the flat (4-inch work) 2 ft. 9 in. above the level of the floor, finished with a coping of cement or thick slate. The doors at either end of the house 3 ft. 8 in. wide and 6 ft. 4 in. high, to allow free access when filling the borders with soil, or when emptying them. The roof to be trellised with strong galvanized wire 9 in. apart and 16 in. from the glass, and the structure ventilated from end to end, at the ridge, by simultaneous opening gear. The house may be made to any length, according to requirements, and supplied with water tanks according to its size. There should be no difficulty in growing Melons in a house of this description if the cultural details are properly attended to. But Melons can be grown well in large houses containing a miscellaneous collection of stone plants. There are several large span-roofed houses in the gardens under my charge where I grow Melons, Cucumbers, pot Vines, and a collection of plants together, and I have no hesitation in saying that they are all fairly well grown. But I do not recommend growing Melons with other plants when it can be avoided.

With respect to the aspect these houses should occupy, there is much difference of opinion. Most writers, however, recommend that span-roofed houses should run north and south, while others contend that they should run east and west. I have several span-roofed houses where

I grow Melons that occupy both aspects, and I find no material difference in either. The Melons grow and fruit as well in the one as in the other. But to be successful in the cultivation of the Melon (or indeed of any plant) much depends on attention to little details at the proper time, the neglect of which will lead to failure and disappointment. Seeds for an

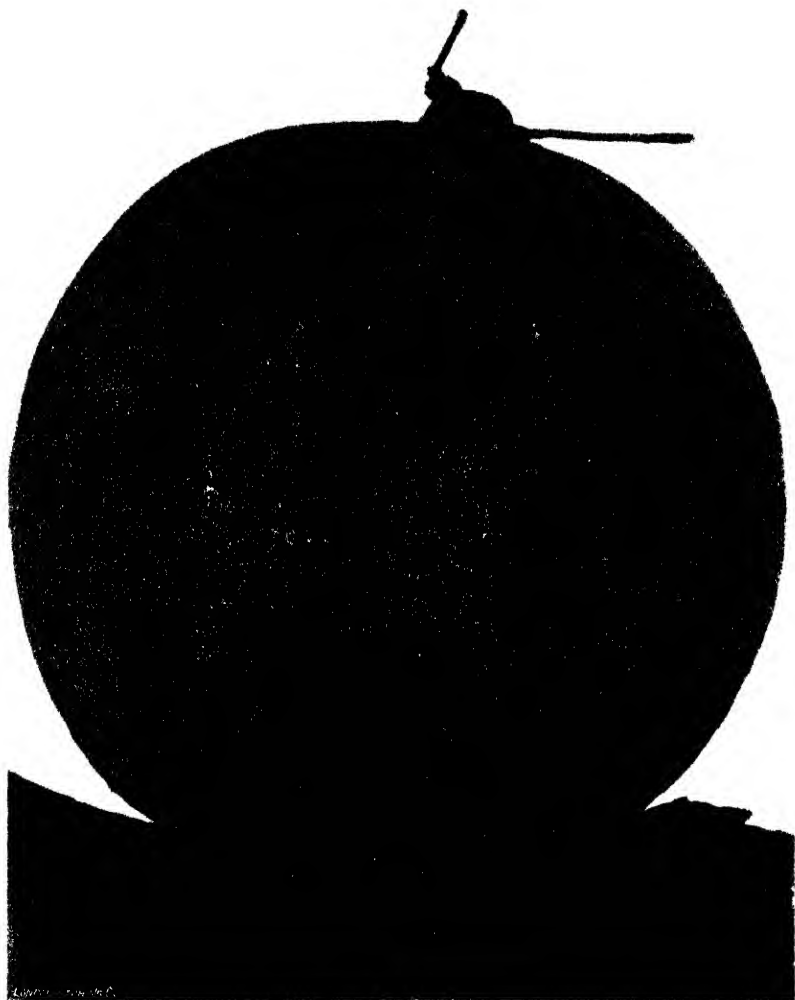


FIG. 32.—MELON 'BLENHEIM ORANGE.'

early crop may be sown the second week in January. I think it is a mistake to sow much earlier than this, as the plants make little progress till the days lengthen. I put a dozen seeds in a 5-inch flower-pot filled with light soil—sifted loam and leaf-mould in equal parts. They are then watered with a fine rose watering can, and the top of the pot covered with a piece of glass, which keeps the soil moist and protects the

seeds from being eaten by mice before germination. The pots are placed in a brisk bottom heat in one of the stoves, and the young plants make their appearance in a few days, and, when large enough, they are potted singly in 8-inch pots. Some gardeners recommend putting two seeds in a small pot, and after germination removing the weakest plant, which obviates the necessity of potting, and the risk of giving the plants a check in the operation. But, after all, the advantage gained by this method is more theoretical than real, and for various reasons I adopt the one first described.

*Soil.*—Melons can be grown in ordinary garden soil enriched with crushed bones, wood ashes, or rotten stable manure, and produce good crops. But from long experience, I consider the best of all soils for the Melon is a yellow fibrous loam taken from the surface of a meadow that has lain in pasture for several years, and stacked in a ridge for some time to mellow before being used. It should then be chopped up roughly, and a little leaf mould, old mortar, and wood ashes added to it, and all thoroughly mixed together by turning it over several times. In soil of this description I grow Melons for three years in succession without changing it. Some time before it is required, it is dug over to the bottom, and the soil thrown up roughly to dry and sweeten. Before planting it the lumps are broken, and the border trod all over, made firm and level, and mounds of fresh soil made on the top to start the plants in.

Some growers still continue to fill only a portion of the border at first—just sufficient soil to start the plants—and when it is permeated with roots more soil is gradually added until the border is filled. I do not think there is much advantage gained by this method; besides, it makes more labour at a season when there is plenty of other work to be done. I always have the borders filled at once and made firm, and the soil is allowed to get thoroughly warm before the plants are set out. To do Melons well they should be allowed plenty of room to develop, and I never plant them closer than four feet apart, on mounds of earth raised four inches higher than the level of the border, and fourteen inches wide on the top. But previous to planting neat stakes are put into each mound long enough to reach the first wire on the trellis, and from the top of each stake to the top of the trellis a thin strip of split bamboo cane is tied to each of the wires to make them firm for training the main stem of the plants to. After planting has been finished, earthenware collars, a foot in diameter and four inches deep, are slipped over the plants and pressed firmly in the soil encircling the stems, so that the person watering the borders—if careful—can do so without putting any water inside the collar, as the earth here is kept as dry as possible to prevent the plants from damping off at the base. To guard against water getting inside the collars when syringing the plants pieces of strong brown paper with slits in them to the centre to go round the stems are placed over the collars. This prevents any water getting inside of them, if the papers are removed as soon as syringing is finished. By adopting these simple means it is seldom, indeed, that the plant damps off at the neck, if it has been properly planted, and put no deeper in the borders than it was when growing in

the flower-pot. The plants receive one good watering after being planted, but never any more inside the collars. The borders should be watered whenever they require it, sometimes as often as three times a day, when the plants are in full vigour and the weather hot and sunny.

As the plants grow the main stems are trained to within a foot of the top of the trellis and then stopped by pinching out the points, and before they have finished growing the stems reach to the top of it. The lateral shoots between the cotyledons and first wire of the trellis are rubbed off, and the others trained to the wires and stopped at the

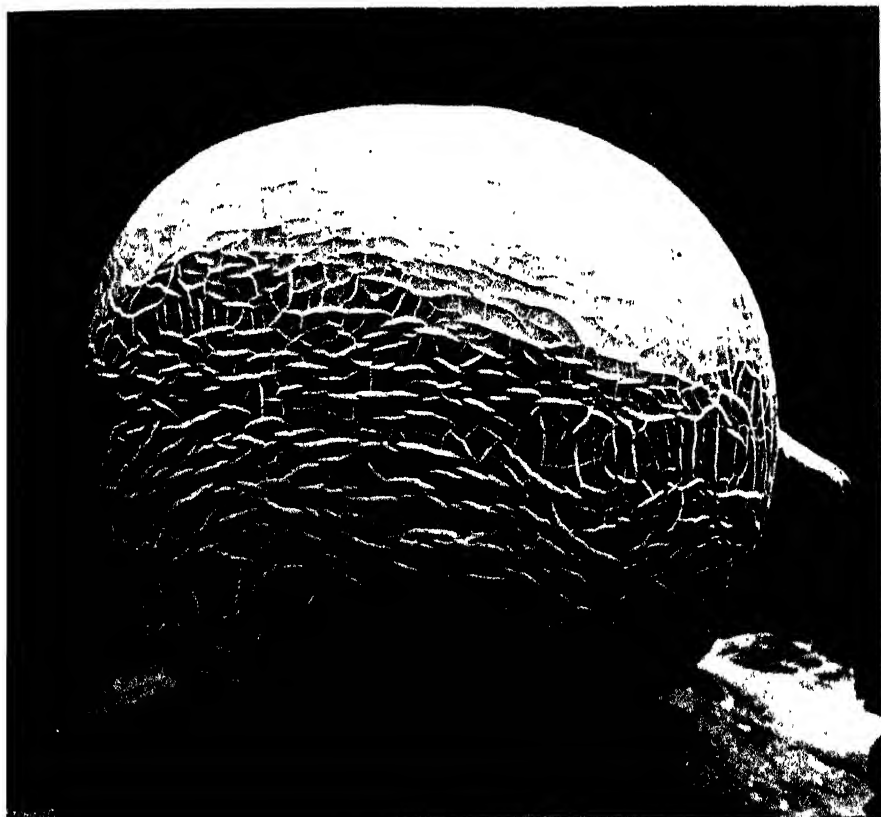


FIG. 33. — MELON 'GOLDEN ORANGE.'

second leaf beyond the female flower, and all the sub laterals are stopped at the first leaf, and the tendrils pinched off as soon as they appear on the vine.

Some garden calendars of the present day recommend that the flowers should not be fertilised before a sufficient number are out at the same time to form a crop. I think it makes little difference when they are fertilised. I make it a rule to pollinise the first female flower that opens, and continue to do so as they open; and I find no difficulty in the plants setting a good crop which swells off freely and ripens satisfactorily. If more fruits set than the plants can support—which is often the case—

they swell for a little, then turn yellow, and are cut off, but this does not interfere with the crop in the least. The plants on an average mature from six to eight large fruits each the first crop; and I have had strong healthy plants ripen as many as nine fruits the second crop, well finished fruits, from 4 lb. to 6 lb. each, which some judges of Melons consider large enough.

When the fruits have grown to the size of Cocoanuts they are supported from the trellis by pieces of flat wooden boards, five inches square, with holes in the centre, which allow any water that collects on them after the plants are syringed to run off. The boards have a piece of strong copper wire fastened at each corner, and when the fruit is placed on them the wires are secured to the trellis in a position that enables the fruit to swell away without coming in contact with it. This system of supporting the fruits has the great advantage of allowing them to be easily lowered or raised as occasion requires without giving much trouble. During the time the fruits are swelling the plants are liberally supplied with artificial manures, and liquid manure from the cow-house. Thomson's Manure and Clay's Fertiliser are spread on the surface of the border in a dry state and watered in, and the liquid manure from the cow-house is diluted with water. The borders are lightly top-dressed with sifted loam and leaf-mould two or three times during the season to cover the young tender roots which mat the surface and are exposed to too much light and air. The plants are gently syringed once a day - early in the afternoon when the houses are shut up—but the paths in hot weather are damped down several times during the day, and a moist growing atmosphere maintained, which accelerates the swelling of the fruits and keeps the foliage clean and healthy. Plants treated in this way are seldom injured by red spider or other insects. Whenever any of the leaves have finished their functions and assumed a yellow colour they are cut off close to the stem, or branch, with a sharp knife, and a pinch of slacked lime put on the wound, which dries up immediately. When thinning out superfluous branches they are treated in the same way to prevent bleeding.

As the fruits advance towards maturity the atmosphere is kept drier and more buoyant, but the plants are watered at the root the same as before, and the borders are never allowed to approach to dryness. If the weather is warm and genial at this time a little air is left on the house during the night, which thickens and strengthens the foliage and invigorates the whole plant.

With strong, healthy plants there is no difficulty in getting them to produce a second crop, and in much less time than would be the case if young plants were employed. I find from experience that after a fruit has grown to a certain stage - some weeks before it ripens—it does not absorb much nutriment from the plant, and I have often had plants set a second crop of fruit before the first was all ripened. Directly after the crop has been gathered the plants are gone over and the useless growths cut out, the borders top-dressed, and the house kept a little closer, and the atmosphere a little moister than it was when the fruit was ripening to encourage new growth. In a short time the plants respond to this treatment, and produce healthy growths with plenty of female flowers,

which set much better than they did in the early part of the season. The plants receive the same treatment as that described for the first crop, and by careful attention the foliage is kept clean and healthy till the last fruit has been thoroughly ripened.

The names of the varieties of Melons that have been cultivated since I can remember are legion, and still they go on increasing. New varieties, with First-class Certificates from the Royal Horticultural Society, are sent out every year by our enterprising seedsmen, but very few indeed

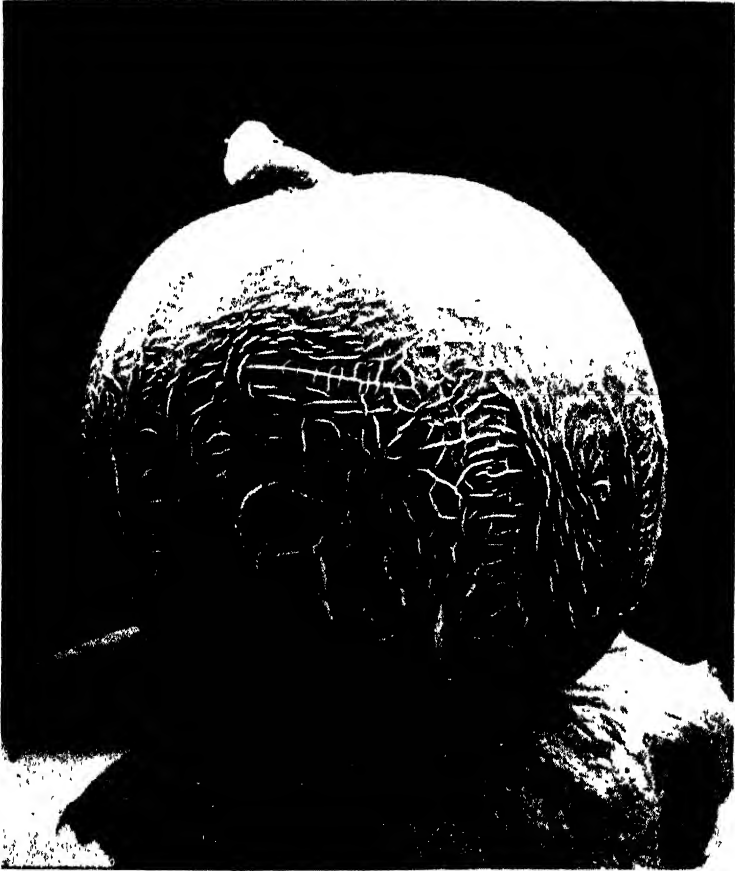


FIG. 34. MELON 'EASTNOR CASTLE.'

of the Melons that were in vogue forty or fifty years ago are grown now.

It is some twenty years since Mr. Crump, of Madresfield Court, raised 'Blenheim Orange Melon' (fig. 32), and, in my opinion, it is the best scarlet-fleshed variety in cultivation at the present time. And for a white-fleshed Melon Carter's 'Holborn Favourite' has few equals. The plant is strong and vigorous, a free setter and a sure bearer. The fruit is of the largest size, sweet, melting, and juicy, and finely netted.

Little & Ballantyne's 'Golden Orange' (fig. 33), does not seem to be so well known in the south as it should be. It is one of the most handsome

white-fleshed Melons in cultivation. Fruit large, oval shape; skin a bright yellow colour, and beautifully netted; flesh juicy and of excellent flavour. 'Eastnor Castle' (fig. 34) is one of the best flavoured green-fleshed Melons in commerce, but there is some difficulty now in getting seeds of the true strain.

I have thus endeavoured to fulfil the task of showing the progress that has been made in the culture and development of the Melon during the professional lifetime of a single individual. I may not have said much that is new—it were, indeed, almost impossible to do so in these times of widely diffused knowledge. But I hope I may have been able to some extent to succeed in the object I had set before me of setting forth, with some measure of clearness and accuracy, the past and the present, and the methods by which, under the guidance of science and experience, I have had some degree of success in the cultivation of a favourite home-grown table fruit.

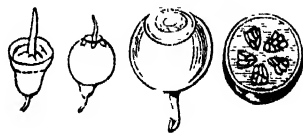
#### DISCUSSION.

Mr. GEORGE WYTHES, V.M.H., said he did not altogether agree with Mr. Pettigrew's remarks both as regards culture and varieties. In the first place, excellent Melons could be grown with less attention to details and in very different structures to that advised. In these days, when quantities of fruits are required, the cultivator was obliged to adopt other methods, and often with excellent results. Large growers did not go into details such as mentioned. Soils were not studied with such great care; and often that at command would not be considered good, but was made the most of, and gave good returns. Melons had to follow other crops, and had to be grown in a short time, to make room for another, and he failed to see any good in the starving of Melons by using poor soil; but by growing correctly at the start a crop is secured much earlier. Melons can be grown in frames with great success by attention to moisture. Years ago frame-culture produced excellent fruits. As regards new varieties, it is useless to condemn them, as Melons unless grown with great care soon deteriorate and become mixed, and in raising new varieties there is a chance of a good one—and the Royal Horticultural Society made the test a rigorous one before an award was granted. It was not an easy matter for a new Melon to get an award. He considered the Fruit Committee do good work in this respect, but admitted he had himself often failed to secure an award when expected. Melons from outward appearances are most deceptive as regards flavour. He did not entirely agree with Mr. Pettigrew's list, and could have added some excellent varieties, but even then failures will occur.

Mr. A. DEAN referred to the great unreliability of Melons in respect of flavour or general table quality, even from the same plant. He wished we could rely on their coming as consistently to character as did Pears and Apples, Peaches and Nectarines, and similar fruits. But it was a fact that varieties which had the highest reputation for excellence, still would, even with what seemed to be the best cultivation, not infrequently be the reverse of good, and sometimes be even nauseous. He agreed with Mr. Wythes that Mr. Pettigrew's method of culture differed greatly from what was tried in many directions. He specially referred to what he had

seen at Mr. Mortimer's Farnham nursery, where eight long houses, all span-roofed and so low that they were entered by sunken doors and paths, were all devoted just now to Melons. Two crops a year were taken, but from diverse plantings—one quite early in the year and one at mid-summer. The houses being low needed less fire heat than did bigger ones. The plants grew in single rows on either side of the houses, not on mounds, but in troughs 20 inches wide, and with sides 6 inches deep. They had open or trellis bottoms, were of wood, and movable. These were set up just over the side pipes, filled with good loamy soil, and the plants put out at about 14 inches apart, each one carrying, after the first wire was reached two shorter branches. In that way splendid crops of Melons were produced. When the first crop was cut the plants were cleared out, also the troughs and soil: the former were cleansed and lime-washed, then replaced with fresh soil and plants, and thus the second crop was taken off. Of course the flowers carrying fruit were fertilised with pollen from the male blooms as fast as they were produced, but in no case did one plant carry more than about four fruits. These were invariably fine, and shanking of plants or defects in the fruit were of the rarest. The collection usually included all the best known varieties, old and new. One great feature of Mr. Mortimer's culture, which he had specially noticed, was that the houses and the atmosphere in them were kept much less damp than was habitually the case. It was common experience to find in Melon-houses not only tanks of water, but the floor all slops and puddles, and the atmosphere reeking with humidity. That sort of thing was never seen at Farnham, and to it he attributed much of the success which attended Mr. Mortimer's method of culture. It was a matter for considerable comment how far culture or treatment did or did not affect flavour. It was so odd that whilst certain varieties had high reputations for flavour, yet they exhibited it relatively so seldom. To what was that irregularity of character due? It could not be to variety; hence it seemed as if culture must be at fault. Possibly we should find greater average high flavour in Melons if a drier system were generally adopted.

Mr. D. HARRISON, who is very successful in growing Melons out of doors, said: "The plants I raise in a hot-bed, having no Melon or Cucumber-house. For the first crop I sow early in March, and afterwards plant out on a partly exhausted hot-bed, and as soon as the plants have become established I leave the lights off night and day, although, should the weather suddenly become colder or rough, I put the lights on during the change. Or for later use I make a hillock on the hard ground, with the same treatment. In this way I have obtained Melons measuring 18 inches in circumference and of excellent quality."



## CROCOSMIA AUREA, AND TRITONIAS (SYN. MONTBRETIAS).

By MONSIEUR EMILE LEMOINE.

[Read August 28, 1900.]

*Montbretia crocosmiflora* and the series of plants derived from it form a very interesting botanical group, not simply from the point of view of the gardener, who knows the many uses of these beautiful plants, but also from the naturalist's point of view.

It is generally admitted by all that hybrids are as a rule either absolutely barren or at most produce descendants as lacking in number as they are also in vigour and in reproductive qualities. Now *Montbretia crocosmiflora* is a hybrid, and by no means an ordinary hybrid, for it is one of the very small groups of bigeneric hybrids, its two parents ranking as species of different genera; and yet it has given birth to a long line of vigorous and fertile plants which are almost indispensable for the ornamentation of gardens, and whose use as cut flowers is quite unsurpassed.

It is more than fifty years since the family of Irideæ was enriched by the introduction of *Tritonia aurea*, whose name was changed some years after by Planchon to *Crocosmia aurea*, because he found that all the characteristics of this species were absolutely distinct from those of the old *Tritonia crocata*, or *Ixia crocata* and other allied species. Though greatly praised at its first introduction, this plant was, however, not very extensively grown, and one only met with it in the gardens of amateurs, who were more enthusiastic over rare and interesting species than over popular flowers which could be planted in orderly masses of bright colours producing a great but somewhat vulgar effect.

From a small round corm springs a little tuft of long narrow leaves from the centre of which rises a flower spike 2 or 3 feet high, slightly branched and decked with large regular blossoms, with six orange-coloured segments, the individual flowers opening successively. As soon as the fertilisation is complete the fruit develops into a bright reddish-brown globular capsule, which looks like a berry, but contains three large reddish-purple fleshy seeds. The corm sends out very long underground stolons, which, if the plant is left undisturbed, produce new corms, often at considerable distance from the parent. A light soil is best for *Crocosmia aurea*.

The introduction of *Montbretia Pottii* is of more recent date, hardly exceeding twenty-five years. Although the flowers of this species are much less beautiful, it nevertheless rapidly became popular, and was extensively cultivated, the reason being that though the individual flowers are smaller and less regular and showy, there are far more of them on each bloom-spike, and the plant is hardier, less exacting as regards soil and cultivation, and much more vigorous. Each corm sends out quantities of short stolons, which shoot up all round it, so that at the end of the season you have a clump instead of a single plant. The flowers are irregular, and opposite each other on the spike; the three

stamens are placed parallel to one another above the style, and the fruit consists of a dry capsule, with three many-seeded compartments, the little seeds being dry and grey.

The crossing of these two species effected by Monsieur Lemoine, of Nancy, produced *Montbretia crocosmiflora*, which he put into commerce in the year 1882. It is needless to sing its praises, for every one knows its orange-red flowers with six segments twice as long as those of *Montbretia Pottsi*, and opening successively all along the tall spikes with their numerous branches. Every one knows, too, its wonderful vigour, the ease of its cultivation, and the rapidity with which it increases, so that it is by no means surprising that it is found in every garden on the Continent, and is absent from but few in England.

This bigeneric hybrid bears seed naturally; but as these produce plants almost identical with the parent, it is not of much interest to raise seedlings. Very great interest may, on the other hand, be obtained by raising plants from seeds of *M. crocosmiflora* artificially fertilised with pollen of one or other of its parents. This was done from the very first by M. Lemoine, and the result has proved most satisfactory, and certain different characteristics have been produced in these new forms which it has been found possible to fix, to modify, and to improve by cross-breeding. We must limit ourselves to a chronological list of varieties of *Montbretia* successively sent out from Nancy, at the same time remarking that several of them have since been discarded from our list as being inferior to our later acquisitions.

In 1883 we sent out *M. elegans* (since discarded), a dwarf plant with bright orange-yellow flowers.

In 1884 came *M. aurea*, chrome-yellow, and *M. pyramidalis*, apricot (both discarded).

In 1885 appeared *M. 'Bouquet Parfait'* (discarded), large scarlet and yellow flowers; *M. 'Gerbe d'Or'* (discarded), golden-yellow trumpet-shaped flowers; and *M. 'Etoile de l'eu,'* with large open flowers, which is still one of the best of the bright-red varieties.

These were followed in 1886 by *M. 'Phare'* (discarded), like *M. crocosmiflora*, but somewhat more erect; *M. 'Solfaterre'* (discarded), pale yellow; and *M. Pottsi grandiflora*, which would have been more appropriately named *M. Pottsi discolor*.

In 1887 *M. 'Drap d'Or,'* with large golden-yellow flowers; *M. 'Eldorado,'* a very dwarf plant with flowers of the colour of yellow ochre; *M. 'Incendie'* (discarded), small bright-red flowers.

In 1888 *M. 'Rayon d'Or'* (discarded), yellow with large segments; *M. 'Talisman'* (discarded), small orange flowers; *M. 'Transcendant,'* orange and yellow.

In 1889 *M. 'Pluie d'Or'* (discarded), golden yellow; *M. 'Soleil Couchant,'* one of the most beautiful of all the yellows; *M. 'Tigridie'* (discarded), yellow-ochre colour spotted at the base.

In 1890 *M. 'Aurore,'* beautiful golden-yellow flowers.

In 1891 *M. 'Etincelant,'* bright red; *M. 'Feu d'Artifice,'* magnificent spikes of orange and yellow, a beautiful plant well fitted for the centre of a group.

In 1892, *M. 'Auricule,'* ochre colour with decided brown markings at

the base ; M. 'Fantaisie,' very erect, scarlet and yellow ; *M. flore pleno*, double flowers yellow-ochre-coloured ; M. 'Fleuve Jaune,' of the clearest sulphur colour.

I break off the chronological list of varieties here because from this date certain new constituents have had a share in the production of Montbretias, for during the last few years two varieties of *Crocasmias*, previously unknown, have been introduced.

*Crocasmia aurea maculata* was received from South Africa through the agency of Mr. James O'Brien, V.M.H. It is distinguished from the type by its much larger flowers, by the more regular and symmetrical arrangement of its segments, and, above all, by the existence of very curious brown spots situated at the base of the perianth.

A short time afterwards Herr Max Leichtlin, of Baden-Baden, sent out a giant variety of *Crocasmia aurea*, to which we gave the name of *C. aurea imperialis*. The spikes are twice as high as those of the type, and the flowers and the segments twice the size. Its colour is of a magnificent and brilliant orange-yellow. Herr Max Leichtlin is said to have obtained it by selection from several successive generations of seedlings. It is certain, however, that this plant does not come true from seed.

The crossing of these two new species with our Montbretias has given us several magnificent varieties, but unfortunately a large number of our seedlings, and by no means the least beautiful of them, were attacked by a disease very common in beds of *C. imperialis*, and, though with great regret, we have felt obliged to destroy a number of varieties of really very striking beauty in order that none but entirely disease-proof ones might find their way into commerce.

Having thus explained the advent of fresh and distinct *Crocasmia* influence, we resume our chronological list.

In 1891 the following varieties appeared :- 'Arc-en-ciel,' magnificent orange flowers spotted with brown, still a very rare sort ; 'Eclatant' (superior to 'Etincelant' and 'Volcan'), with spikes more than 4 ft. high and orange-red flowers.

In 1895, 'Lustre,' a very vigorous variety with erect flowers of yellow-ochre colour ; 'Turban,' yellow, freely spotted with black.

In 1897, 'Couronne d'Or,' maroon and yellow ; 'Martagon,' yellow and orange, with very curiously shaped segments reflected like the Martagon Lily ; 'Oriflamme,' scarlet, with a golden centre ; 'Brilliant,' the most beautiful of the scarlets, superior to 'Etoile de Feu' ; 'Congo,' golden yellow ; 'Diadème,' yellow, spotted with maroon ; 'Profusion,' orange and brick-red. In 1898, 'Distinction,' yellow, edged with orange ; 'Globe d'Or,' double golden yellow flowers ; 'Tête Couronnée,' very large orange-yellow flowers with a large black ring in the centre.

In 1899, 'Auréole,' a curious plant having golden-yellow flowers with a large centre of pale straw colour, edged with a broad chestnut-coloured border ; 'Messidor,' pale Naples yellow passing through straw colour, and almost white.

This list does not pretend to include all the varieties of Montbretia that have been put into commerce, for many raisers (for example, M. Léonard Lille, of Lyons ; Herr Pfitzer, of Stuttgart ; M. Walker, of Bougival ; Messrs. Gerbeaux and Crousse, of Nancy) have raised very

interesting varieties. It is of interest more from an historical point of view than from that of its practical use to amateurs; indeed, its chief object is to show the progress made from year to year with this particular family of plants.

To those who wish to plant extensively for the purpose of either forming beds or securing abundance of cut flowers I should recommend the following as being vigorous, easy of cultivation and of increase, and producing an abundant succession of flowers:—‘Etoile de Feu,’ ‘Eldorado,’ ‘Transcendant,’ ‘Soleil Couchant,’ ‘Feu d’Artifice,’ ‘Auricule,’ ‘Fantaisie,’ ‘Fleuve Jaune,’ and ‘Volcan.’

But for those who desire to collect into their gardens beautiful plants which are not to be found everywhere I should recommend ‘Aurore,’ ‘Flore Pleno,’ ‘Turban,’ ‘Martagon,’ ‘Oriflamme,’ ‘Brilliant,’ ‘Globe d’Or,’ ‘Tête Couronnée,’ ‘Auréole,’ and ‘Messidor,’ but not forgetting *Crocoshia aurea maculata* and *C. aurea imperialis*.

The culture of Montbretias is of the simplest. They delight in light and sandy soils exposed to the sun, but they also do very well in heavy and clay land. The dry corms may be planted in March or April, or they may preferably be started in frames and planted out when partly grown. During the flowering season, which lasts from July to September, they should be watered in case of drought. After the flowering is over they may be left in the open air if they are covered with a layer of dry leaves, at least in climates like ours at Nancy, where the winters are often very severe. We prefer, however, to take up the corms in autumn, storing them in layers during the winter in sand, or in any other material holding a little moisture, to protect them against frost or heat. They must not be allowed to become quite dry, as in that case the multitude of offsets which surround each corm are in danger of being entirely dried up and the increase of the plants is very much hindered. In the case of *C. maculata* and *C. imperialis* it is absolutely necessary to store them in flat layers, as the stolons, which in their case are much longer and fewer in number, are much more easily destroyed, and the corms themselves also sometimes refuse to start.

The disease which I have already mentioned as occurring amongst my seedlings has also been remarked by others. Whilst the plants are in full and vigorous growth a few of the leaves suddenly turn yellow and dry up. Then the flower spike does the same and the plant is rapidly destroyed. If you cut the corm in halves you see that most of the woody fibres have turned black. It is necessary to at once discard and burn all the affected corms and only to keep those which are absolutely free from the disease. Moreover, we advise that whilst the corms are out of the ground they should be dipped two or three times during the winter in some “Bouillie Bordelaise.” It is a precaution which has rendered us the greatest service. Another precaution consists in not planting Montbretias for several years in the same soil or place where the disease has existed.



## THE STRAWBERRY MILDEW.

*(Sphærotheca Humuli* (DC.) Burr.)

By ERNEST S. SALMON, F.L.S.

DURING the past season of 1900 several cases of crops of Strawberries completely ruined by this fungus have come under my observation, and reports have also reached me of the occurrence of this disease from many widely separated localities. The severity of the disease—causing in the worst cases the Strawberry fruit to be at once ruined for the market—and its economic importance demand that serious attention should be paid to the subject.

*Historical.*—It has been known for some time that Strawberries are liable to be attacked by a "mildew," although it appears that—at any rate in England— it is only quite lately that the disease has shown signs of causing destruction on a large scale. Apparently the first mention of the disease appears in the *Gardeners' Chronicle* for 1854, where Berkeley (1) reported that a crop of Strawberries (Cuthill's Black Prince) had been entirely destroyed by a mildew. This fungus, from the description given, was evidently *Sphærotheca Humuli* in its conidial stage, although Berkeley referred it to "*Oidium Balsamii*, the Turnip Mildew," the conidial stage of an *Erysiphe*.

In the *Garden* for 1885 J. Cornhill (2) reported the occurrence of a "mildew" in Strawberry pits, and recorded the successful treatment of the plants with sulphide of potassium.

In 1886 the disease in America attracted the attention of Professor J. C. Arthur (3), who identified the fungus as *Sphærotheca Castagnei*, Lév.

In 1892 Humphrey (4) recorded the occurrence of the "Powdery Mildew of the Strawberry" on plants grown at the Massachusetts Agricultural College. In this case the fungus confined its attacks to the leaves. Lodeman (5), in "The Spraying of Plants" (1896), notes the occurrence of *S. Castagnei* on the berries and leaves of the Strawberry, but states that "the disease is rarely serious."

In the *Journal of the Board of Agriculture* for September 1898 (6) an account is given of a fungous disease which is stated to have seriously attacked English Strawberries during the season of 1898. In this account the fungus is identified as *Sphærotheca pannosa*, the common Rose Mildew. There is no doubt, however, that a mistake in the identification was made, and that the fungus under observation was really *Sphærotheca Humuli* (= *S. Castagnei*, Lév., in part).

*Description of the Disease.*—In the first stages of attack the fungus affects the leaves, causing them to curl at the margin, and so expose their under-surfaces, giving an appearance as though the plants were suffering from want of water. On these diseased leaves the fungus is found in its conidial stage, and is almost entirely confined to the under-

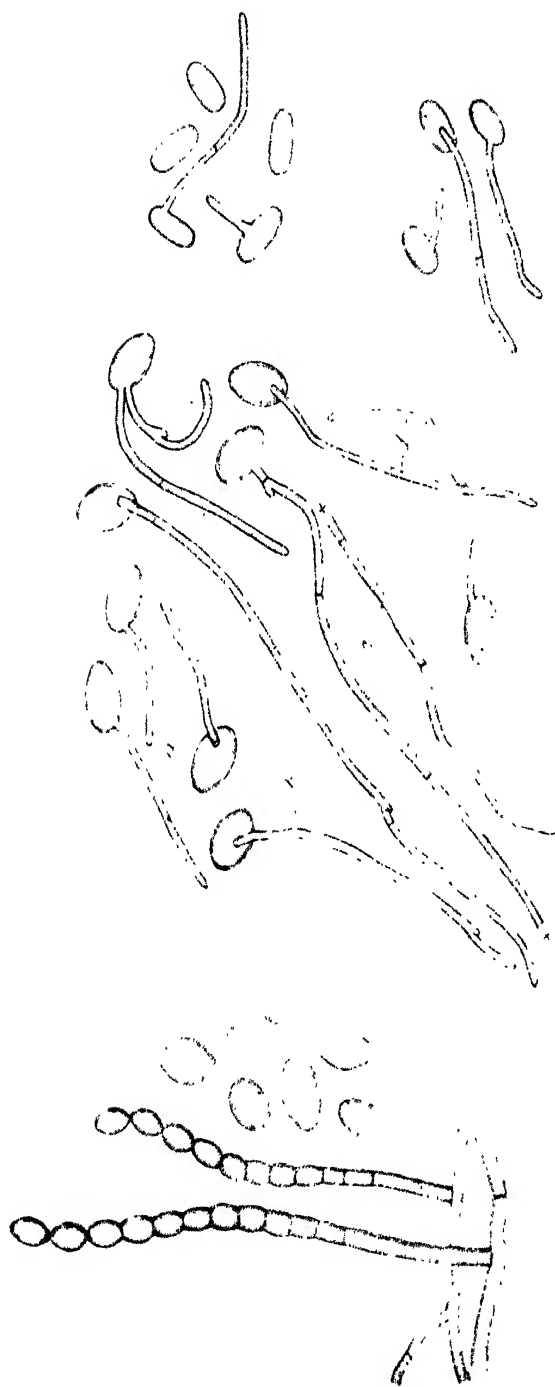


FIG. 35.—At left, two conidiophores ( $\times 200$ ) and conidia ( $\times 300$ ) of the Strawberry Mildew (*Sphaerotheca Humuli* (DC.) Burr.), in centre, three conidia, shown after being exposed for 12 hours to a temperature of  $0^{\circ}\text{C}$ ., germinating after 17 hours in a hanging drop of water; germinating after 17 hours in a hanging drop; at right, above, 5 conidia of the Rose Mildew (*Sphaerotheca pannosa* (Wallr.) Lévl.)  $\times 300$ , two germinating after 5 days exposed for 12 hours to a temperature of  $0^{\circ}\text{C}$ .; to right, below, conidia of *Oidium furiosum*, Cooke (on Apple trees),  $\times 300$ , germinating after the same treatment.

surface of the leaf. On this surface is found the mycelium of the fungus, consisting of a great number of white, delicate, creeping, septate hyphæ, much branched and interwoven. On this mycelium innumerable upright branches, or *conidiophores*, are produced, at the apex of which unicellular spores, or *conidia*, are produced in a long chain in basipetal succession. (See fig. 35.) Myriads of these conidia are produced, and soon cover the under-surface of the leaves with a white powdery meal. The conidia are capable of immediate germination, and being carried by the wind or insects to fresh beds quickly spread the disease. In this conidial, or *Oidium* stage, the present fungus can be easily distinguished from the Rose Mildew (*S. pannosa*), as in the latter the conidia are longly elliptic or sub-cylindrical, and measure about  $30 \times 14 \mu$  (see fig. 35), while in the Strawberry Mildew the conidia are much wider and of a different shape, and measure  $30 \text{ } 35 \times 20 \text{ } 24 \mu$ . (See fig. 35.)

The mycelium sends suckers, or *haustoria*, into the epidermal cells of the leaf, and by means of these extracts its nourishment from the Strawberry plant. Eventually reddish-coloured patches appear on the under-surface of the leaves, which remain after the mycelium has disappeared: these are due to epidermal cells killed or affected by the fungus.

Soon after its appearance on the leaves the mildew, in bad attacks, begins quickly to spread to the fruit. The berries in all stages of development are attacked: the green fruit when overrun by the fungus begins to dry up, and does not colour nor reach maturity, while the ripe fruit continues juicy, and, except in the severest attacks, when the whole berry is white as though dusted with flour, remains more or less red. The first indication of the fungus on the fruit is usually to be found in the presence of mycelium and conidiophores on the "seeds" (achenes), from which centres the fungus gradually spreads and invests the whole of the succulent part of the fruit. The fungus is truly parasitic on the fruit, sending haustoria into the epidermal cells of the succulent parts between the achenes. (See fig. 36.)

Later in the season the fungus produces a second form of fruit. This consists of perithecia, each of which contains a single ascus with eight ascospores. I have not yet seen this form of fruit on English Strawberries, but Prof. J. C. Arthur has kindly sent me examples from America (now in the Kew Herbarium). The characters shown by these specimens refer the fungus to *Sphærotheca Humuli* (DC.) Burr. The perithecia occur on the petioles of the leaves, and are only very sparingly produced. A group of three of these perithecia are represented at fig. 36, together with an ascus and ascospores. The cells of the perithecial wall (fig. 36) average about  $15 \mu$  wide.

*Varieties Attacked.* - It is stated in the *Journal of the Board of Agriculture* (6) that "all kinds of Strawberries were equally affected." In the outbreaks of the disease observed this year, however, it certainly appeared as though some varieties were, as regards their fruit, more or less immune from the disease. Thus in one case, while the fungus quickly ran over the fruits of 'Paxton' and 'British Queen,' the fruit of both the 'Noble' and the 'Royal Sovereign' escaped. This was all the more remarkable because the plants of the two last-named varieties were grown in close proximity to those of the other varieties; yet, although in

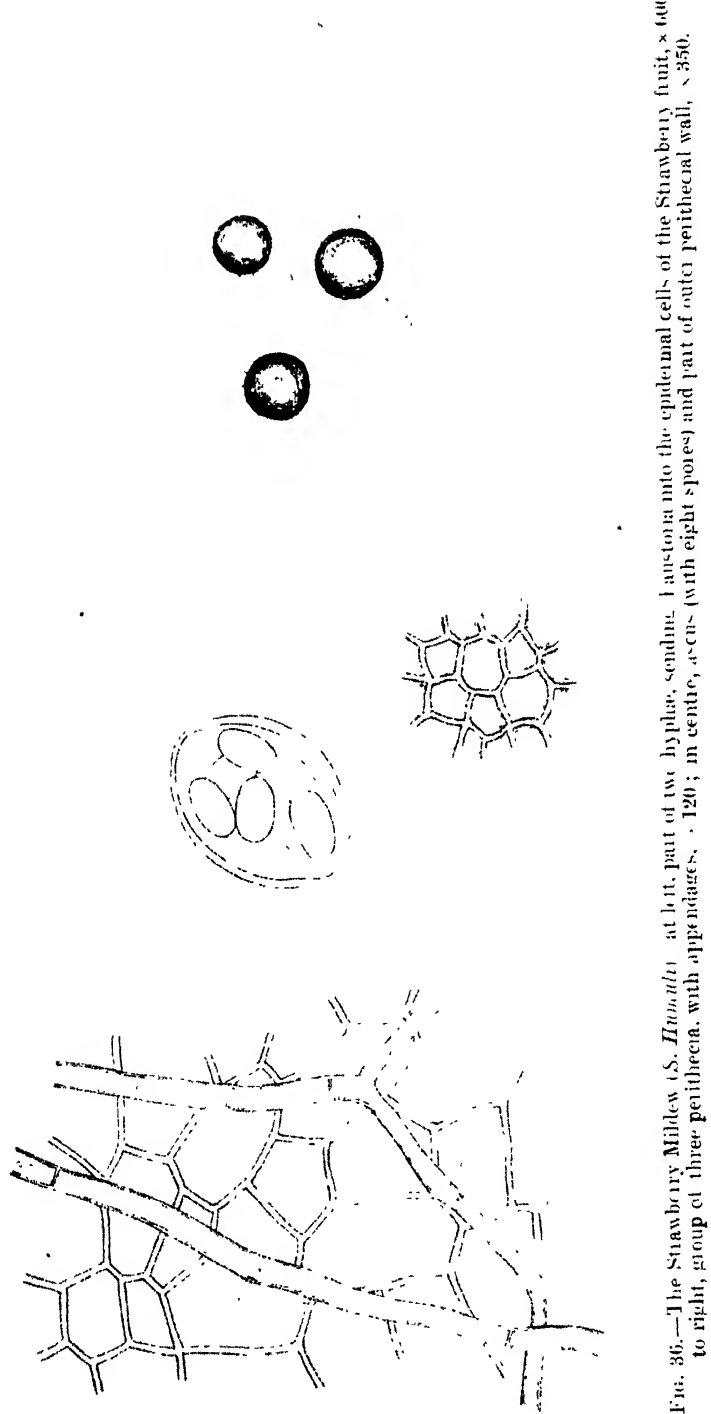


FIG. 36.—The Strawberry Mildew (*S. Hirsutula*) at left, part of two hyphae, sending Haustoria into the epidermal cells of the Strawberry fruit,  $\times 600$  to right, group of three perithecia, with appendages,  $\times 120$ ; in centre, ascus (with eight spores) and part of outer perithecial wall,  $\times 350$ .

the case of the former the leaves were more or less affected by the fungus, not a fruit in the whole crop (according to the testimony of the gardener who had personally gathered the fruit) showed any signs of the mildew. Mr. George Massee informs me that the Strawberries in the neighbourhood of Yarmouth suffered very severely from the attacks of the mildew, the crop in many cases being rendered unmarketable, and that here also the fruit of the 'Royal Sovereign' was found to resist the disease.

A correspondent from Bedfordshire reports: "We have never before had a general attack of mildew as in the present season. It has generally been confined to 'Black Prince' and allied varieties. 'Sir Joseph Paxton' is also subject to attack on some soils and in certain seasons. I saw a curious instance lately of the special liability of certain varieties to attacks of the mildew--a bed of 'Viscountess H. de Thury' had a few plants of 'Paxton' growing amongst them, and in every case the 'Paxtons' were badly mildewed while the others were quite free."

Berkeley (1) noticed that, while the crop of 'Cuthill's Black Prince' was destroyed, plants of 'Keens' Seedling,' standing on the same shelf as the former, remained perfectly free.

Professor J. C. Arthur (3) has also recorded that, while the 'Jucunda,' 'Mount Vernon,' 'May King,' and 'Garretson' were attacked, other varieties nearly or wholly escaped.

*Climatic Conditions favourable to the Disease.*—As regards the climatic conditions favourable to the appearance of the disease, there seems to be a consensus of opinion among gardeners that these are to be found in sudden alternations of temperature, especially a decrease of temperature during the night, or a cooler temperature caused by rain followed by hot sunny weather.

Some experiments I have made on the germination of the conidia seem to give some evidence on this subject. Conidia sown in hanging drops of water at ordinary temperature were found to germinate very unsatisfactorily, only a few of the conidia producing short germinal tubes.

Various media were used, but with no better success. It then occurred to me to try the effect of a low temperature on the germinating powers of the conidia. I was led to do this from the remarks of many observers on the subject of the general conditions favourable to the appearance of mildew on plants. Thus in the Report of the Commissioner of Agriculture for 1885, p. 39 (Washington), it is stated: "There is much in connection with the appearance of mildew on the foliage of plants which would indicate that it is in most cases the result of cold or aridity in the atmosphere, or perhaps rather in their combined action." It has, too, been frequently asserted by horticulturists that cold draughts of air will bring on mildew to Roses. Further, Eriksson had already experimented on these lines with regard to the germination of *Uredo* spores, and reached the conclusion that "it must be regarded as proved that cooling down to near freezing-point, or even to a few degrees below freezing-point, has a favourable influence on the germination of the *Uredo* spores" of certain species of "rust," "at least in the condition in which they occur in the open during the warm summer months."

In the experiments on the present fungus, Strawberry leaves covered with conidia were subjected to a temperature of 0° C. for twelve hours,

and the conidia were then sown in a hanging drop of water at ordinary temperature. In some cases conidia were placed direct on blocks of ice for twelve hours before being sown. Control experiments were made at the same time with conidia taken fresh from Strawberry plants in the open. In all cases the conidia subjected to this low temperature were found to possess greater powers of germination than those sown straight from the plant. The favourable effect of the treatment was shown not only in the slightly higher percentage of conidia that germinated, but especially in their more vigorous subsequent growth. This is seen at fig. 35, *b* and *c*, drawn from conidia germinating in a hanging drop. At fig. 35, *a*, three conidia, sown direct from the plant, are shown germinating after seventeen hours in water; at fig. 35, *b*, three conidia, sown after being cooled, are seen to have produced much longer hyphæ. The greatest development that was observed among untreated conidia is shown at fig. 35, *d*, where two conidia are represented after being sown for five days; at *c* is shown the much more vigorous growth that the cooled conidia exhibited after being sown for four days in a hanging drop.

It would appear, therefore, that in nature a decrease of temperature may cause plants to be attacked by mildew, not only because the vitality of the plants may perhaps be weakened, and so rendered less able to withstand the attacks of parasites, but also by directly increasing the germinating powers of the spores of the parasitic fungus.

*Fungicides.*—Experiments were made with two fungicides: (1) a preparation made as follows: One ounce of carbonate of copper is mixed with five ounces of carbonate of ammonia and dissolved in a quart of hot water; when dissolved sixteen gallons of water are added. This is the mixture recommended by Humphrey (4). (2) the well-known fungicide against *Oidium*, made by dissolving a quarter of an ounce of sulphide of potassium in a gallon of water.

The plants treated with these two fungicides were selected as being the worst affected, and stood side by side with untreated plants during the experiment. After a few good sprayings the treated plants showed signs of considerable improvement. The plants sprayed with No. 1 mixture were noticeably healthier and more vigorous than any of those in the untreated rows. Not only was the mycelium on the older leaves killed, but these leaves, previously badly affected and more or less curled, had so far recovered as to uncurl and resume their normal appearance; also on the young leaves no trace of the fungus, after a careful search, could be found. On the plants treated with No. 2 mixture the fungus had nearly disappeared, although on the young leaves isolated patches of *Oidium* still existed. On the older leaves, however, the fungus had been killed, and the leaves had nearly resumed their normal appearance.

It seems probable, therefore, that spraying with either of these fungicides—preferably with No. 1 mixture—would be successful in combating the disease; but it must carefully be borne in mind that preventive measures must be taken while the fungus is in its early stage on the leaves, for once in full vigour on the fruit nothing can be done to save the crop. As the mycelium is wholly superficial it is possible that spraying with hot water (as hot as the Strawberry leaves will bear) might

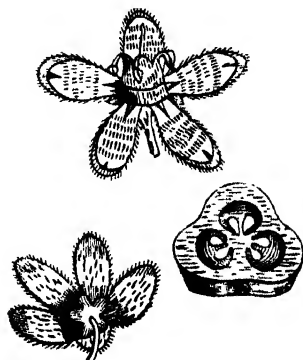
succeed in killing the fungus, as this treatment has lately been reported in the *Gardeners' Chronicle* (vol. xxvi. 1899, pp. 166, 167) as being successful in the case of the closely allied Rose Mildew.

*Concluding Remarks.*—*S. Humuli* is already well known as the "Hop Mildew," a disease which in certain years causes immense loss to Hop growers. Besides growing on the Hop and Strawberry, the present fungus has been recorded on no less than eighty-one other species of host-plants, of which about twenty are more or less common British wild plants. As there is every probability that the fungus spreads from these wild plants to the Strawberry, it is well to destroy, as far as possible, all mildewed weeds in the neighbourhood of the beds. One of the commonest weeds frequently attacked by *S. Humuli* is the Meadowsweet (*Spiraea Ulmaria*), also the Wild Hop, and species of Willow-herb (*Epilobium*).

If, as seems to be the case, the Strawberry Mildew is rapidly increasing the severity of its attacks, and extending its area of destruction, it will become one of the most serious evils with which the Strawberry grower has to contend. It is characteristic of diseases of the present kind to appear in periodic waves, causing wholesale destruction of the crops attacked, and the invasion of the Kentish and other large Strawberry gardens by the present fungus in its worst form would undoubtedly cause similar ruin to that brought about by the first outbreaks of the Hop and Vine Mildews. In view of this danger, therefore, it behoves Strawberry growers at the first appearance of the disease to at once use fungicides, and to take every measure to prevent the disease from spreading.

#### BIBLIOGRAPHY.

1. BERKELEY, M. J.: in the *Gardeners' Chronicle* for 1854, p. 236.
2. CORNHILL, J.: in *Garden*, xxviii. 1885, pp. 39, 40.
3. ARTHUR, J. C.: Report of the Botanist to the New York Agric. Exper. Stat. (Extr. from 2nd edit. of Fifth Annual Report New York Agric. Exper. Stat. for 1886), 1887, pp. 275, 276.
4. HUMPHREY, J. E.: Report 1892, pp. 31, 32, and 37 (Massachusetts Agric. Exper. Stat.).
5. LODEMAN, E. G.: The Spraying of Plants, 1896, p. 365, fig. 90.
6. *Journal of the Board of Agriculture* for September 1898, vol. v. pp. 198-201.



## THE GOOSEBERRY MILDEW

(*Spherotheca mors-uvæ* (Schwein.) Berk. & Curt.).

By ERNEST S. SALMON, F.L.S.

DURING last August I received from Mr. F. W. Moore, of the Royal Botanic Gardens, Glasnevin, some diseased Gooseberries. On examination the berries were found to be covered with the brown scurf-like mycelium of a fungus—the American Gooseberry-mildew (*Spherotheca mors-uvæ* (Schwein.) Berk. & Curt.). This is the first record of the appearance in the Old World of this fungus, which has hitherto been known only from the United States. The particulars of the outbreak are as follows:—The affected Gooseberries were sent to Mr. Moore by Mr. J. Nixon from the gardens at Whitehall, Ballymena, Co. Antrim. In answer to my inquiries Mr. Nixon kindly informed me that no plants of any kind had ever been introduced into the gardens from America, so there seems no reason to doubt that the fungus is indigenous. Mr. Nixon says.—“The outbreak is now very extensive, although the fungus only appeared on two trees at first. I observed it about the beginning of June in slight quantity, more especially on amber berries, but now there are none free entirely. We have now about forty trees almost covered with the fungus, which has attacked the leaves and stems as well as the berries.”

Parts of Gooseberry branches were sent by Mr. Nixon, on which nearly every berry was attacked. The fungus forms on the berries dense matted brown patches, which at first are distinct from one another, but later become confluent and more or less completely invest the fruit. (Fig. 37.) This matted or scurf-like growth is the persistent mycelium of the fungus, and is composed of numberless branched flexuous and interwoven brown threads or *hyphæ*. (Fig. 37.) Among these *hyphæ* the *perithecia* are produced, each of which contains a single *ascus*, with eight *ascospores*. (Fig. 37.)

In the United States the present disease is widely spread on cultivated and wild species of *Ribes*, and constitutes the most serious obstacle to the cultivation in that country of “foreign” varieties of the Gooseberry (*i.e.* those developed from the native Gooseberry of Northern Europe), as it is found that these almost invariably fall a prey to the mildew.

Several American mycologists have treated of the disease. Halsted (1) gives a comprehensive account of its ravages in America, and in order to show the destructiveness of the disease gives the following extracts from the works of standard American authors on fruit-culture:—“The mildew of the Gooseberry is the most serious obstacle to the successful culture of the foreign Gooseberry in the United States. In the cool and moist climate of England it does not exist; in the extreme northern parts of the Union it is not formidable; but on approaching the Middle States, although the bushes grow vigorously and set abundant crops of young fruit, the latter becomes covered with a thick brown or grey mildew or scurf which destroys their value.” “The mildew is the one great enemy

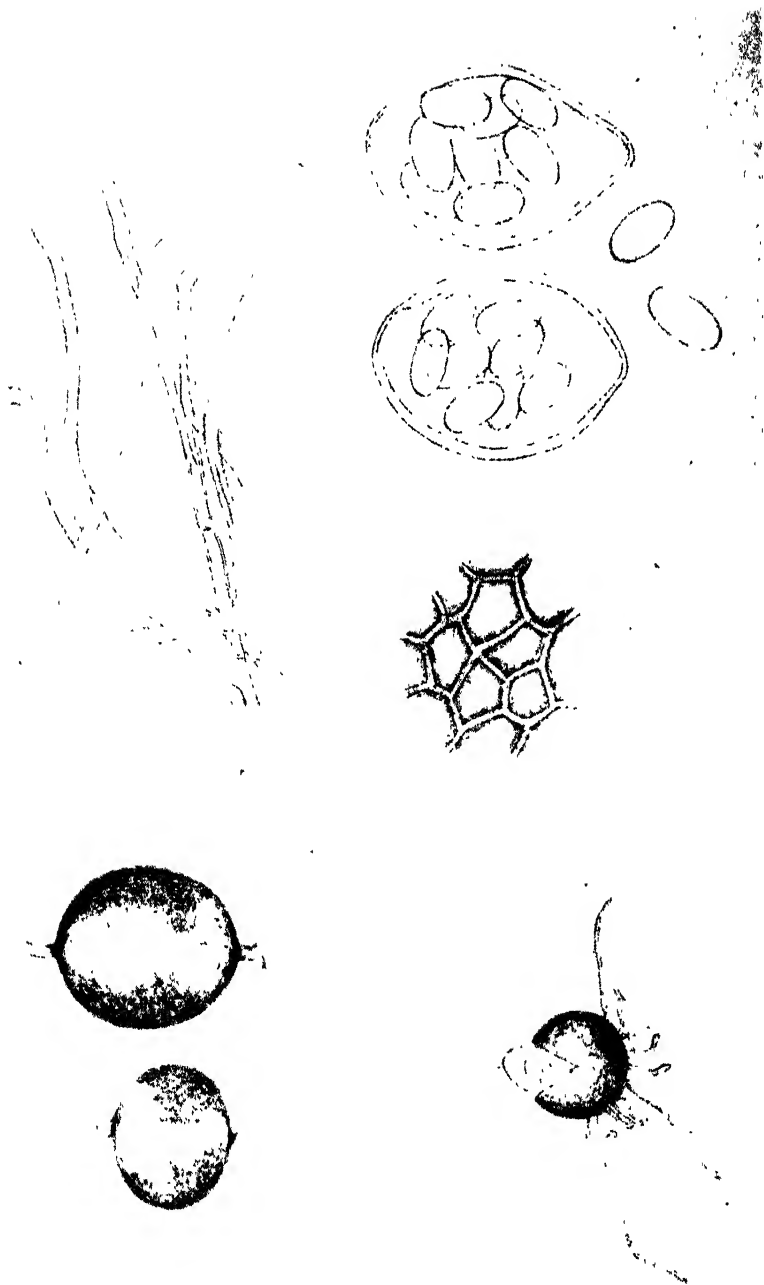


FIG. 37.—The Gooseberry Mildew (*Sphaerotheca mors-uvae* (Schwein.) Berk. & Cunt.); above, to left, two berries, covered with the dark patches of the fungus, nat. size; to right, hyphae of the persistent mycelium,  $\times 400$ ; below, to left, an isolated perithecialium with appendages,  $\times 150$ ; to right, part of outer perithecial wall, and two 8-pored asci,  $\times 400$ .

of the Gooseberry in the United States. It not only attacks the fruit, but often extends over the whole plant, effectually checking its growth. So prevalent has this become that the foreign varieties are almost universally discarded, as there are few localities where they will succeed."

The following account is given of the manner in which the fungus commences its attacks:—"The mildew first makes its appearance upon the young half-grown leaves and the unfolding terminal bud of the shoot. In its early stage it has a cobwebby appearance, which soon becomes white and powdery from the development of the light conidial spores. Soon after this thin patches of the same character may be found upon the forming berries. Usually one side is more attacked than the other, and as the berry continues to grow it becomes one-sided or curved, because the fungus retards the development upon the infested side. If the berry is entirely covered its further development is generally checked. Later in the season the leaves, and especially the petioles and the young stems bearing them, turn a rusty-brown colour, and become thickly coated with the fungus. The berries at the same time are covered with brown patches of mycelium, which may be readily peeled off from the smooth skin of the fruit."

Goff (2), in 1888, tried the effect of potassium sulphide as a fungicide for diseased bushes, and found that the new growth, as well as the crop of fruit, was very perceptibly greater on the treated plants. The substance was applied in solution in the proportion of one-half and one-fourth of an ounce of the potassium sulphide ("liver of sulphur") to a gallon of water, and the spraying was commenced as soon as the leaves had begun to expand. The application was repeated after every hard rain.

Close (3) has a valuable article on the present mildew, in which are detailed the results of experiments in treating the disease on a commercial scale. The attacks of the fungus are fully described as follows:—"The Gooseberry Mildew generally makes its appearance during the last half of May or first half of June. It is first noticed as glistening frost-like spots on the fruit on the lower part of the bush where there is usually dense shade. As the disease progresses the spots enlarge, turn dark brown, and form a felt-like covering over a part or all of the berry. . . . Two or three weeks after the mildew attacks the fruit it appears on the young tender twigs, especially on the tips. If the attack is severe the new growth will be destroyed, and the older growth will be considerably injured. In the case of a very severe attack the fruit will be rendered worthless, and the foliage will be nearly or entirely killed during July. As a result no fruit-buds are set for the next year's crop, and the bushes are so badly weakened that they may suffer from winter injury. In a few commercial plantations, where little or no spraying was done, the crop of fruit was destroyed and the bushes practically ruined by this disease. In other plantations, where spraying was carefully done, the greater part of the crop was saved, the foliage remained in good condition, and fruit-buds were set for a succeeding crop."

A series of experiments was made during three seasons to test the comparative value of potassium sulphide, Bordeaux mixture, lysol, and formalin as a fungicide, and it was proved conclusively that potassium

sulphide was by far the most effective. It is stated that in wet seasons the disease flourishes and is difficult to control, while in dry ones the mildew can be almost entirely prevented by the thorough use of fungicides. The strength of the potassium sulphide should be one ounce to two or three gallons of water, and "spraying should be begun very early, just as the buds are breaking, and continued at intervals of about ten days."

We see, therefore, from the accounts given above that this new Gooseberry disease which has just appeared in Ireland is capable of causing the most serious damage on a large scale. It is therefore a matter of economic importance that steps should be taken to stamp out, if possible, the disease at once. From the consideration of analogous cases it seems only too probable that the disease may spread throughout Britain, and invade other parts of Europe. In 1845 a mildew, closely allied to the Gooseberry Mildew, appeared on Grapes grown at Margate, England. This was subsequently proved to be identical with a fungus up to that time known only on vines in America, and it has therefore been supposed by some botanists that this Grape disease was introduced from America. Directly after this mildew appeared in England it spread immediately all over Europe, devastating the vineyards of France, Germany, Italy, Switzerland, &c.

In conclusion, it may perhaps be well to add that there is another mildew, closely allied to *Sphaerotheca mors-uvæ*, which attacks Gooseberry-bushes. This fungus, which is known as *Microsphaera Grossulariæ* (Wallr.) Lév., is not so dangerous in its attacks as the *Sphaerotheca*, as it does not attack the berries at all, only running over the leaves with its white mycelium, and causing them to fall prematurely. The perithecia, which are produced on the leaves, are each provided with from five to twenty-two outgrowths, or *appendages*, a little longer than the diameter of the perithecium. Each of these appendages is four to five times branched in a dichotomous manner at its apex. This *Microsphaera* occurred side by side on the same bough with the *Sphaerotheca* in the gardens at Ballymena. (For a full description and figures of the *Microsphaera* reference may be made to my "Monograph of the *Erysiphaceæ*" [Memoirs of the Torrey Botanical Club, vol. ix., New York]; or to the *Journal of the Board of Agriculture*—"Gooseberry Blight"—for September 1897, pp. 202-204, London.)

#### BIBLIOGRAPHY.

- (1) *Halsted*, B. D.: The Powdery Mildew of the Gooseberry (Report Commissioners Agric. for 1887, pp. 373-380, pl. xi. (Washington, 1888).
- (2) *Goff*, E. S.: Exper. in the Treatment of Gooseberry Mildew (*Journ. of Mycology*, v. 1889, pp. 33, 34).
- (3) *Close*, C. P.: Treatment for Gooseberry Mildew (New York Agric. Exper. Stat. Bullet., No. 161, November 1899).

## GOOSEBERRY RUST, OR LEAF-SPOT

*(Septoria ribes).*

By T. W. KIRK, F.L.S., &c., Biologist to the Government of New Zealand.

[The following Note has been kindly forwarded to us by the New Zealand Department of Agriculture.]

THIS fungous disease caused considerable trouble in several quarters during last season. It attacks both gooseberries and currants. The first notice the gardener has of its presence is the appearance of small spots, usually of a brown colour, upon the leaves. If not attended to, these spots rapidly become more numerous, till the whole foliage is thickly covered. The result is that the leaves fall and the plants are left almost



FIG. 38. UPPER AND UNDER SURFACES OF LEAVES ATTACKED BY SPOT FUNGUS

bare, which greatly weakens them and reduces the following year's crop. As the disease usually appears late in the season, the plants should be sprayed with ammoniacal carbonate-of-copper solution. After the crop is off, Bordeaux mixture may be used, and should be again applied, full strength, before the buds break, early the following season, as a preventive. All leaves should be raked up and burned.

The following are the directions for making ammoniacal carbonate of copper, and Bordeaux mixture:—

*Bordeaux Mixture, an excellent standard formula, convenient for reducing to any required strength.*

Take sulphate of copper (perfectly pure), 6 lb.; fresh unslaked lime, 4 lb.; water 22 gallons. Place the sulphate of copper in a piece of sacking or any light cloth. Suspend it by a string from the top of the barrel, a few inches below the surface of the water, to dissolve, using 18

gallons of water. Then slack in a wooden tub 4 lb. of perfectly fresh lime in as small a quantity of water as possible, adding the water little by little, never enough to cover the lumps, until slaking has been completed, when slowly make up to 4 gallons. When cool, thoroughly stir and strain slowly the milk of lime into the copper solution, stirring thoroughly while mixing, and for an additional minute or two; it is then ready for use as a winter spray, and is called a 22-gallon mixture. By adding the requisite quantity of water, at the same time observing to keep the mixture thoroughly stirred, it can be diluted to a 30-, 50-, or 60-gallon mixture for spring and summer use.

It is important to observe the method of combining the ingredients; also, that the copper should be pure, and that unslaked lime should be used, not air-slaked. It is further important to note that in order to obtain the best results the mixture should be applied within eight hours from the time it is prepared, or at most twenty-two hours, owing to a chemical change which takes place.

In the application of Bordeaux mixture a general line of treatment to be recommended is—During winter, or before the buds start in spring, spray all the fruit-trees with the 22-gallon strength; again, just as the petals drop, with the 60-gallon mixture.

If Bordeaux mixture is made and applied as above, it adheres tenaciously to the wood and foliage; there seems no need for the addition of treacle.

#### *Stock Solution, Bordeaux Mixture.*

Owing to ordinary Bordeaux mixture requiring to be used at least within twenty-four hours from the time it is made, stock solutions are now prepared, ready for mixing, of both milk of lime and sulphate of copper. This is found a great convenience for use in large orchards. These stock solutions are prepared as follows: Firstly, by dissolving in a barrel 100 lb. of sulphate of copper to 50 gallons of water by exact measurement, so that each gallon will hold in solution 2 lb. of copper-sulphate; secondly, a stock solution of milk of lime is prepared by dissolving slowly in water 100 lb. of fresh stone lime, to be made up to 50 gallons, so that each gallon of the solution will contain 2 lb. of lime. This solution of milk of lime, if kept airtight, will remain fit for use for several days. After about the fifth day it would be better to make fresh.

In preparing Bordeaux mixture from the stock preparation First, take 3 gallons from the stock solution of sulphate of copper, and add to 17 gallons of water in a barrel. Second, from the stock solution of milk of lime, after thoroughly stirring, take 2 gallons, more or less, and pour slowly into the sulphate-of-copper solution placed in the barrel, all the time stirring and carefully watching the colour; when a clear sky-blue colour shows, immediately stop adding the milk of lime: it is then ready for use. The foregoing may be considered a 22-gallon formula. For a 30-gallon formula add additional 8 gallons of water; or, for a 60-gallon formula, add 38 gallons of water, stirring thoroughly all the time.

*Carbonate-of-copper Solution.*

Procure a tub or barrel, and in this dissolve 6 lb. of copper-sulphate or bluestone, in 4 or 5 gallons of water. In another vessel dissolve 7 lb. of washing- or sal-soda, using hot water for the purpose. When the solution is cool, pour it slowly into the vessel containing the copper-sulphate liquid, stir the mixture thoroughly, then allow it to stand twenty-four hours. Now siphon off the clear liquid and allow the sediment, which is carbonate of copper, to stand for a day or two, until it becomes pasty. For every 7 oz. of this paste add 3 pints of strong ammonia (which may be bought of any chemist), or enough to dissolve the sediment. The liquid thus obtained is concentrated ammoniacal solution. To prepare it for spraying, it is only necessary to dilute 3 pints with 45 gallons of water.

In order to avoid staining the fruit, &c., do not use more strong ammonia than is absolutely necessary to dissolve the carbonate of copper. A valuable fungicide.

If the powder of carbonate of copper could be purchased, or the ammoniacal carbonate-of-copper solution put up in bottles, with instructions, ready for diluting to standard strength, it would be convenient.

To prepare the powder of carbonate of copper for use, first make into a thin paste by adding a pint and a half of water, then add slowly 3 pints of strong aqua ammoniæ, and thoroughly stir until a clear, deep solution is obtained, when dilute with water to 45 gallons.

## GOOSEBERRY-LEAF MILDEW

(*Microsphaeria grossularia*).

By T. W. KIRK, F.L.S., Biologist to the Government of New Zealand.

[The following Note has been kindly forwarded to us by the New Zealand Department of Agriculture.]

THIS is easily recognised, causing, as it does, the bushes to have a white patchy appearance, as though splashed with whitewash. It is caused by a surface-fungus which extracts nourishment from the leaves by means of tiny suckers.

Spray with Bordeaux mixture; or with sulphide of potassium, 1½ lb. to 50 gallons of water; or dust thoroughly on a fine hot day with finely powdered sulphur.

## SAVING AND USING THE RAIN.

By Mr. PETER E. KAY, V.M.H.

[Read September 25, 1900.]

OF all the bounties of Nature the rains from heaven are the most valuable, as without them all man's toil would be useless, and nothing affects a country's power to support man and beast so much as sufficient rainfall to fructify his labours. When those times occur that the rainfall is deficient, or altogether absent, as is sometimes the case in India, Australia, and other parts, such calamities follow as we in this part of the globe can scarcely realise. The periodic droughts in India and Australia especially are the most outstanding results of a deficient rainfall within a certain period of time over large areas. As it is true that the characteristics of the natives of any country are through the generations determined by their physical surroundings, so are the kind and quantity of the crops of any country determined—taken, of course, in conjunction with the zones in which they are situated by the amount of rainfall.

The collected observations of the rainfall are very remarkable for their wide differences in various continents, and great disparities exist within the area of the British Isles. In all parts these variations can be scientifically accounted for, and result from the physical character of the districts, as, for instance, a mountainous contour or proximity to the ocean. In Europe the rainiest regions are found to be in the west. The annual rainfall exceeds 80 inches over a large district, including Inverness-shire and Argyleshire, in the Lake District of England, and most of North Wales, and these parts are recorded to be among the wettest in Europe.

In England the highest mean annual rainfall is 177 inches, at Seathwaite in the Lake District; in Scotland, 151 inches on Ben Nevis and 128 inches at Glencroe in Argyleshire. In Ireland the largest is 78 inches. The driest part of the British Isles is the district south of the Wash, with a rainfall of about 20 inches.

Generally speaking, the greater part of the annual rainfall takes place in the winter half of the year. The British Isles exhibit none of the extremes that are found in other parts of the globe; for instance, there are what are termed the rainless regions in Peru, Sahara in Africa, and the desert of Cobi in Asia. On the other hand, it is said of Patagonia that it rains every day. The heaviest rainfall recorded is 464 inches at Cherra Punji in the Khasia Hills, and is due to the steepness of a mountain range facing the Bay of Bengal. In the great and lasting work of collecting and systematising the data of the rainfall over the British Isles no name is more conspicuous, and no man deserves more gratitude, than the late George James Symons, F.R.S. Before Mr. Symons so definitely began to observe and scientifically record the rainfall in England in 1860, there were no sufficient data for comparative and practical purposes available. The British Rainfall Organisation, founded by Mr. Symons in that year,

carries on a work which places us, whether we are cultivators of the soil or belong to other callings, under lasting obligation.

Knowing the fundamental value of studying the rainfall of any country or area, one would naturally make it a great factor in deciding upon the suitability of a district for the purpose of agriculture or horticulture, as it follows, especially commercially, that where Nature has endowed a spot with special advantages there the undertaking will have the most powerful ally. Of course this is a truism, and applies to all industries; but water is so necessary itself, together with the cheap manipulation of it, that we horticulturists must always place it equal with every other essential, such as soil and climate. The ideal place to start a nursery or vineyard we all find out, after the experience of many years in positions that probably environment placed us in. But conditions change, competition goes on apace, compelling us more and more to enlist to the utmost all the advantages we possibly can.

Happily, in taking a wide view of the advantages and disadvantages of countries and places—and allow me to observe of persons as well—we can generally see a law of compensation tending to equalise things. Confining our attention to the rainfall, it is particularly to be taken full advantage of, as falling free from heaven in that very form best suited to perform the miracle of the increase from the culture of the soil. But although no man can improve upon Nature, still, if it is not too presumptuous to say so, we may direct and regulate her in the way that she herself teaches us very distinctly in the form of the great lakes spread over the surface of the globe.

They are the natural savings of the rains and snows, and man following in her silent examples makes artificial lakes or reservoirs, some very extensive and some very small, as in the case of the Egyptian or Staines reservoirs, or the cottager's water-butt.

In India, owing to the calamitous times of famine which are brought to pass by the absence of rains, great works have been undertaken for conserving the rain. During the last quarter of a century no man has done so much for the irrigation of North-Western India as Colonel S. S. Jacob, C.I.E.

In twenty years he has perseveringly carried out no fewer than over one hundred different works at a cost of fully half a million sterling, and they now pay  $5\frac{1}{2}$  per cent. When a good rainy season fills the reservoirs nearly 100,000 acres are irrigated, and by the works carried out Colonel Jacob has so saved the rain that he has for ever protected a very large area from famine in that part of India. To the extending of such policy the rulers and the Government are straining every resource, and with the actual success already accomplished have encouraging examples to stimulate them. In Australia also the works for saving the rain have been, and are largely being, executed. Parenthetically, it may be observed that agriculture, although the predominating work, the carrying on of which depends entirely upon rain and irrigation works, is not the only industry where water is vital. In the large mining centres of Africa, Australia, and America the value of the mines is entirely dependent upon the necessary water, which often can only be obtained by saving the rain. In the greater works lightly referred to, where the object is to save the rains

and irrigate large areas, great engineering knowledge is necessary, although there are no principles contained in hydromechanics that are not common to all times and places.

But the more immediate object of these remarks is to draw attention to the great value of saving and using the rain falling on vineyards, nurseries, market gardens, and farms, especially in relation to the cases where the whole of the rainfall can be saved from roofs. The first thing to awaken interest in the subject is to consider what really the amount of water the rain of twelve months means.

Every one can easily obtain the information, which is practically mathematical, belonging to his own surroundings. Then arithmetic will astonish him. Taking as example an acre of land, and finding the average rainfall upon it, multiply the average in inches by 22,628, and that will give him the annual quantity of water falling upon that acre in gallons, or multiplying the inches by 101 will give the tons per acre. In the North of London there are meteorological stations, among others, at Finchley and Muswell Hill. The former station is conducted with great care by Mr. J. W. Scott, who has kindly helped me with his experience and accurate data. Mr. Scott has demonstrated that in the district named there is a remarkable deficiency of rainfall in the last fourteen years, as shown by a decrease in the annual average of 1.89 inches as compared with the twenty-eight years' average, equivalent to nearly 7 per cent. It is most important, in judging for practical purposes the annual rainfall of a district, to prevent over-estimate, that the true average should be used for calculation and not any individual year's result. In the North of London the average rainfall from 1886 to 1899 inclusive was 25.56 inches at Muswell Hill, and 25.35 inches at Finchley. So that at Finchley, leaving out decimals, 578,498 gallons, or over 2,500 tons of water, falls annually upon each acre. In parts of the district an equivalent quantity costs over £28. These are facts that require arranging to get at practical results.

If an acre of land is an open farm or garden, then of course the proportion that can be saved depends upon the texture of the soil, the contour of the land, and the manner of drainage. The results recorded by the late revered Sir J. B. Lawes and Sir J. H. Gilbert with regard to the percolation of the rain at Rothamsted from 1870 to 1899 are very valuable in that they afford us information as to the amount of rainfall that passes into what are called the springs. It has been proved at Rothamsted that in the winter months more than one half of the rain penetrates into the soil, and is available for the springs; while in summer only about one quarter passes down to the underground storage. So that, taking the whole country over, it may be said that, assuming the soil and subsoil at Rothamsted to be of such a medium character that in some parts of the country it is more retentive and in some less, it follows that the proportion of rain stored by percolation is less than half what falls. The more highly cultivated a country is, the more quickly the rain passes into the drainage, and the belief that the great watersheds of the country are lower than formerly, and are less plensished in modern days, together with the greater strain upon the underground supplies by the pumping for domestic and other purposes, throws into greater import-

ance the necessity for storing that portion of the rainfall which now passes into the streams and rivers. The more or less profitable storing of the rain must always depend upon the contour of the land of whatever area. The larger subject of provision for populous districts and the irrigation of large estates by saving the rain is fast coming to the front, and is an engineer's question of the not remote future. The Legislature, fully recognising the importance and lastingly valuable nature of water supply, have empowered trustees and others to invest that special form of money, namely trust capital, in reservoirs, tanks, and other allied works that add so much, and so lasting a value, to all lands, agricultural or otherwise.

The question of saving and using the rain can be brought much nearer home to us by the consideration of the question from a purely horticultural point of view, and in writing about the subject one has particularly in mind its commercial aspect. Perhaps thirty or forty years ago the practice of saving and using the rain was more generally adopted than of late years. Certainly originally the first operation in building a greenhouse or vinery was to dig a well to contain the water gathered from the roof. And the horizontal roof area catches the whole of it; no saturation or percolation need be considered. But as the culture of fruit and flowers under glass so marvellously increased, the benefit of saving and using the rain began to be lost in the advantage that was given by a supply from, say, a water company at a pressure which enabled the labour of dipping or pumping and carrying to be saved, and the payment to the said company for water was looked upon as labour that was saved by the simpler manner of application by reason of the pressure.

Then, with further extensions still, the serious charges, amounting, in some instances, to hundreds of pounds per annum, came to be very important, and forced the question of rainfall and application thereof to the front. In looking to the rainfall for watering or irrigating a vineyard or other estate in the open, the subject divides itself into two operations, and they must be taken together to reap the full benefit. Firstly, the reservoir to hold the collected rain; secondly, the means of distribution by gravitation, which nearly always necessitates a tank, both as regards capacity and elevation, commensurate with the area to be irrigated.

As a practical example of using the rainfall the Claiemar Vineyards, Finchley, can be cited. The vineries and other glass houses are entirely used for growing Grapes, Tomatos, and Cucumbers for market, and cover, including the reservoir and roads, about thirty-four acres.

Twenty-seven years ago, when the buildings were commenced, the water supply was almost entirely obtained from the gatherings of the rain, but as the place grew water was laid on from a company with a constant supply at pressure on account of the saving in labour. As the place still grew the idea of saving the rain over such an area of glass became important, as the charge for water, with its mechanical advantages, aggregated to £600 per annum. So the original idea of saving the rain from the individual houses into tanks, which did not give the advantages and economy of pressure, grew into the idea of aggregating the savings of rain from the roofs into one large reservoir, capable of con-

taining five million gallons, plus the means of raising the water to an elevated tank commanding the whole place. This was successfully accomplished, and water from rainfall only is made to water an area of glass which, according to the water-rate paid previously, would amount to over £600 per annum.

The advantages flowing from such a policy are very many. The superiority of rain water over that pumped from great depths, and necessarily of low temperature and very hard, is well known to the practical cultivator, and the result is seen in the crops.

It cannot be too strongly stated that to successfully carry out the idea of saving the rain for irrigation purposes, the contour of the ground is of the greatest importance, and on any site upon which to commence horticultural enterprise, or indeed any industry, the consideration of the water question must have a first place. Although the data for arriving at a correct estimate of the rainfall are within the reach of all, and the principles of hydromechanics are inherent to the question, the carrying out of a scheme over large areas is one where the best expert advice is necessary, and in the end economical. The means of elevation to the required height is quite a special subject. There are so many ways it can be accomplished. The hydraulic ram on estates is very much used, but requires special conditions for its working. Wind-mills of remarkable power are now to be obtained working pumps with the lightest winds; steam, oil, and gas engines, as also hot-air engines, are very generally used. The selection of the type of pumps to be used must always be a matter of careful judgment, and be decided by the special circumstances of the case with regard to the nature of the work to be done by them.

On the whole question, it will, I think, have been seen that using the rain, being suggested by Nature herself, is a wide and essentially fundamental question, affecting us as individuals in every position of life. The intention of this paper is not to promulgate any new theory, or to dictate any methods, but it may direct the thoughts of some, whether the humble cottager or the owner of a large estate, to the value of saving and using the rains which fall free from heaven upon us all.

#### DISCUSSION.

Mr. E. MAWLEY, in proposing a vote of thanks to Mr. Kay for his excellent paper, said that some years ago he made a special visit to Mr. Kay's vineries and he was much struck with one particular detail. He noticed a man watering the vines with a hose in one hand and a watch in the other. He thought this a capital plan when watering with a hose. One plant is often given more water than it needs, and another less. There is no stint in the way of water, manure, or skilled labour in these large vineries, but there is on the other hand no waste. There is generally a tremendous waste of valuable water in gardens and greenhouses, but where storage arrangements are adequate there seems to be a sufficient supply of water (in the shape of rain) for all purposes even in dry seasons.

As to the Rothamsted Percolation Observations, referred to by Mr. Kay, he thought the results there obtained must be regarded as somewhat misleading, owing to the absence of vegetation over each of the three gauges. In order to show the effect of vegetation upon percolation he might state that at Berkhamsted he had two percolation gauges each a yard square and  $2\frac{1}{2}$  feet deep. In March last he had one of these gauges turfed over, leaving the other bare. The result had been that whereas nine gallons of rain water had already come through the bare-soil gauge since the beginning of May, only about a thimbleful had come through the gauge covered with short grass. He considered there was a great difference from a horticultural point of view between the value of hard water and the same quantity of rain water. If Mr. Kay had not preserved the rain water, there would have been tremendous waste. For example, from these twelve large vineries alone he calculated he must collect on an average annually between 2 and  $2\frac{1}{2}$  million gallons of this splendid rain water. The question was a very important one from a meteorological as well as from a horticultural point of view, and he should like to hear the views of those present upon it.

Mr. REECE said that when he started a garden in the suburbs, he had a tank built in the yard, with an outlet into the sewer for the surplus water. During the last two or three years, that water had proved of great value in the garden. The water company, last year, seeing his garden so fine and making certain that he was using their water, sent him an ultimatum to pay two guineas, or otherwise they should stop his supply. His own stored-up supply, however, enabled him to laugh at the company's threats and do without their water entirely. Many people in the suburbs might, at a very small expense, put in their own tank, and have a supply of rain water for their gardens. The last few summers have been especially dry, and he could not say that the reservoir had quite held out every year. But this season, for example, the tank had not run dry. Of course you cannot put a force on it like a high-pressure main.

Mr. ALEXANDER DEAN said that with regard to the waste of water which had been spoken of he should like to know how far there was any actual waste. The general impression was that water existed in the atmosphere in the form of vapour. This vapour rises by evaporation from the surface of the ocean, and from the soil, plants, &c. If so, how is the sea replenished, the mean level being always the same? It is kept up by means of the vast quantities of water supplied by the rivers and smaller streams, and the rain which falls on the surface of the sea. He began to wonder what the effect would be on, say, the Thames, if the river were very seriously depleted in its upper waters by any very considerable storing of rain as in India, &c. It seemed probable that great difficulty would arise. The water which is not saved for purposes of irrigation can hardly be said to be *wasted*, seeing it returns to replenish the natural reservoirs. It was a question then how far it might be desirable to take water from the streams or to keep it from flowing into them. One could not help realising that Mr. Kay had raised a very important economic question. His plan would save a large sum from the water companies. The proposal to construct large reservoirs in the

upper reaches of the Thames had been considered by the Board of Works and also by local authorities. This would be all very well if the reservoirs were filled up only in times of flood when there was a very great overflow; but if the river is to be depleted when the water is low great difficulty might arise. In conclusion he should like to say that this was the kind of paper they were always pleased to listen to.

Mr. R. INWARDS said he had lived for some years in dry countries, where the question of irrigation is always to the fore, and where no one disputed the advantages of saving the water. The question was rather one of how much money may be spent upon it. The rent of land in some parts of Spain, for instance, averaged only about the equivalent of 5s. an acre. This, of course, was for very dry, he might almost say *desert* land. But, on the other hand, where the land was well watered it was worth from £3 to £4 an acre per annum. In that country lawsuits were always arising about the smallest water supply, which was measured by the quantity which would flow through a cane of a certain size. There was a kind of water-mayor in every village, whose business it was to settle these frequent disputes. Then there was the question of cost. If the difference in the rent of watered land, as compared with dry, amounted to as much as £2. 10s. an acre, could water be supplied for anything like that amount? On the sides of mountains and places where gullies were frequent it was practicable by building a dam across the valley and impounding the water. It was done in some parts of the United States on such a scale, with the result that the lower waters were depleted because the high lands had taken almost the whole supply. In some parts a simple contrivance, worked by the wind, might perhaps be used, consisting of a coil of rope or hemp carried over a pulley. This driven at a great speed by the wind raised up the water entangled in the threads and gave it up by pressure at a higher level. It is a good substitute for expensive machinery, where there is water not far from the surface. A wind pump in the corner of a field would yield large quantities of water in that way. These wind pumps can be made to work in the lightest wind, and working day and night will raise a very large quantity of water.

Mr. R. H. CURTIS said he had had no practical experience of the storage of rain from the horticultural or the commercial side of the question, but without doubt a great deal of water was allowed to run to waste, so far as its utilisation for the public good was concerned, owing to its not being intercepted and retained for use at points where it was needed, and at times when it was superabundant. Of course, in a certain sense the water is not "wasted" either when it is thus intercepted or when it is not—in both cases alike it eventually fulfils its part in the economy of Nature. But in countries where the rainfall is unequally distributed over the year—at certain seasons falling copiously and causing the rivers to run in dangerous floods, while at other times the same rivers become little more than a series of pools—the difference to the community caused by storing the surplus of the wet season for use during the scarcity of the dry is very often the difference between a vigorous prosperity and an abject poverty. To give an idea of what this surplus sometimes amounts to in our own country, he

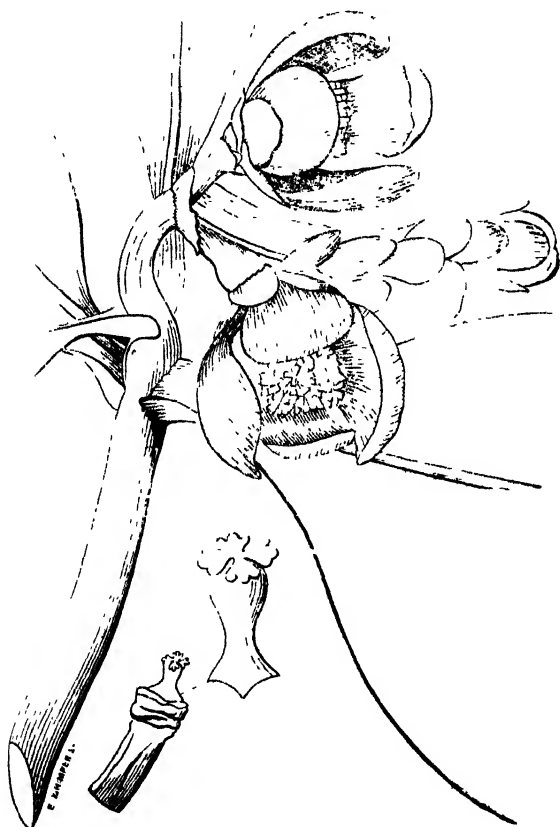
might mention that in the flood of November, 1894, the discharge of the Thames over Teddington Weir amounted to 20,135,700,000 galls. in one day (November 18). The average daily discharge is but 1,362,581,288 galls., or only one-fifteenth of the amount quoted; and allowing 17 galls. to equal a cubic yard, the *excess* of water on that day would have been sufficient to cover to a depth of 3 feet an area of 228,161 acres, or 356½ square miles. He had been interested to hear what the Chairman had said as to the effect of covering his percolation gauge with turf, because there could be no doubt that this was to give the gauge a much closer approximation to the conditions generally found in nature than when the surface is kept bare. The amount of moisture taken up by the vegetation for its own use, and the difference in the amount of evaporation into the air caused, directly and indirectly, by its presence, greatly affected the quantity of water which was available to be passed to the lower strata of the ground. During the warmer half of the year, in ordinary seasons, this was, he believed, practically *nil*; and in the colder half he did not think it could be safely assumed, from the Rothamsted percolation gauge observations, where the surfaces are kept bare of vegetation, to amount to so much as one half. But taking the year through it was certainly incorrect to assume that anything like one half of the total rainfall found its way to the deeper springs; possibly on an average the amount approached to one-fourth of the rainfall, but this he considered to be quite an outside estimate. The lecturer had dealt with his subject in a very practical manner, and this fact had greatly enhanced its value; for when it could be shown that a system could effect so substantial an advantage as the saving of no less than £600 per annum little more was needed to demonstrate its advantages.

Mr. W. MARRIOTT said that the paper ended with a very practical suggestion. There was no doubt that a great deal of saving could be accomplished by utilising the rain water which falls on the roofs of buildings, greenhouses, &c. The late Mr. G. J. Symons, whose work had been referred to by the author, published his first volume of "British Rainfall" for the year 1860, and these volumes had been continued annually up to the present time. There had been a deficiency of rainfall during the last few summers. It was therefore unsafe to base conclusions upon these results. Observations, to be of much value, should extend over a considerable number of years. Mr. Symons's works had put us in possession of valuable data from which we could make definite conclusions.

Mr. E. MAWLEY said that it might not be generally known that this question of the storage of rain water had at one time engaged the attention of the late Mr. Shirley Hibberd, who in 1879 issued a pamphlet entitled "Water for Nothing—Every House its own Water Supply." In the same year Mr. Sowerby Wallis, now at the head of the Rainfall Organisation referred to by Mr. Kay and also by Mr. Marriott, read a paper before the Croydon Congress of the Sanitary Institute on "Rain collected from Roofs."

Mr. KAY replied: "As I stated in my paper, I had no idea of promulgating any new theory, but to call attention to the immense volume

of water which falls, and how easily some of it might be saved for the use of our gardens and fields. I am obliged to Mr. Mawley for pointing out the unscientific manner of calculating the absorption of rain by the soil, as no land which we have to deal with can be said to be without vegetation of some sort. The tables in question should be amended. The immense volume of water which falls means plenty to save, plenty for the streams, and plenty for the rivers."



## NOTES AND GLEANINGS.

## THE PRUNE OR PLUM.

THE cultivated Plum has for its origin the Common Wild Plum (*Prunus spinosa*), which is a native of nearly all the central parts of Europe. In Greece, in Asia Minor, and in the neighbourhood of Damascus, we meet with the best varieties of Plums. The kind cultivated in the department of Lot-et-Garonne is called the Prune d'Agen (Agen is the principal town in the Lot-et-Garonne, and there are grown the finest kinds, Prune d'Ente, Robe de Sergent, Prune de Roi, Prune de Ste. Catherine), to which variety belong those Plums so renowned in La Tourraine, and the common Prune of St. Antoine. The Prune d'Ente and Prune d'Agen are grafted on to the Plum called Quebsche in Alsace and in the Vosges. The fruit of the Prune d'Agen is a beautiful violet in colour, and is sweet mingled with a pleasant acidity. It grows in great quantities on the long regular lines of trees which stretch across the plain. The trees are little pruned and grow to a fine size, with a light yellowish green leafage, and many of them are so covered with grey and yellow lichens that on looking over the plain in the winter months a grey atmosphere, soft in colour, seems to cling and hover over the branches. In the spring it is a lovely sight to ascend the great rocky hillside and see the trees in flower. Then the peasants make a pilgrimage to an old fortified village called La Parade, where one can see across all the plain of the Lot. In the month of August and part of September the fruit is picked up from the ground, for as it ripens it drops; and as it is picked it is placed in baskets or wire trays and put inside a heated brick oven and there left several hours. This process it goes through four times, by which time it is well dried. It is then packed tightly in small wooden boxes and on the topmost layer are placed a few cool Laurel-leaves, and then the lids are securely nailed down, and the Plums of different kinds, sizes, and prices are shipped to England and America and other parts. It is a great business, the picking, sorting, and packing, and requires many hands. —M. C. HAMPSON.

## HYBRID GRAFTS.

MR. GEORGE LEE writes:—"Reading in the Report of the Hybrid Conference the notes on Hybrid Grafts reminded me of what my father did when I was a boy, seventy years ago. He grafted the Lilac (*Syringa*) on the Common Ash. It made a splendid growth; the first year 18 inches or more. He grafted several of them, all of them about 5 ft. from the ground. But in the second year they every one died. A friend of my father's grafted an Apple on a Pear—the Pear was the old Orange Bergamot. The grafts grew finely the first year or two, but eventually they also died. The Pear stock was a large tree headed back and grafted on the crowns."

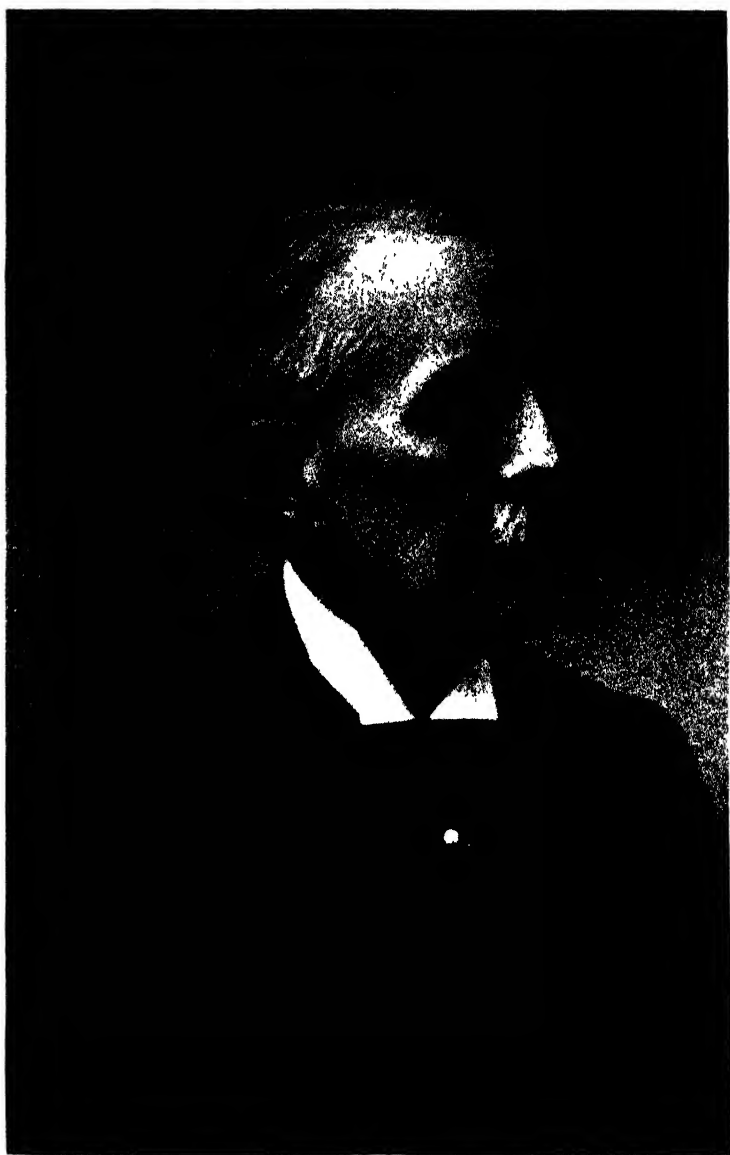
## THE PRESIDENT

### OF THE

# ROYAL HORTICULTURAL SOCIETY.

SIR TREVOR LAWRENCE, Bart., V.M.H., President of our Society, is the son of Sir William Lawrence, Bart., F.R.S., Member of the Institute of France, Sergeant-Surgeon to the Queen, &c. &c., who was created a Baronet in recognition of his distinguished professional services. He died in 1867. Sir Trevor's mother was probably the first prominent English lady gardener; her collections at Ealing Park, now built over, were celebrated all over the world. She died in 1855. The President was born at 18 Whitehall Place, lately pulled down for the new War Office, on December 30, 1831, and was educated at Winchester and St. Bartholomew's Hospital. In 1854 he went out to India in the Medical Service of the East India Company and served through the Indian Mutiny, being for several years stationed in the low Himalayas and the higher ranges. He retired from the Service in 1863. In 1869 he married Bessie, only child of the late John Matthew, Esq., of Burford, Dorking, and has issue three sons and a daughter.

In 1874 he unsuccessfully contested the Parliamentary representation of the city of Gloucester, his family being an old Gloucestershire one; but on the elevation of Sir Richard Baggallay to the Bench in 1875 he was elected M.P. for Mid-Surrey without opposition; and having been re-elected after a contest in 1880, continued to represent one of the divisions of the county of Surrey down to 1892, when he retired from Parliamentary life. In 1892 he was elected Treasurer (*i.e.* principal administrative officer) of St. Bartholomew's Hospital, which is one of the finest institutions of its kind in the world. He was one of the first Aldermen of the Surrey County Council, and is a Member of Committee of the Prince of Wales's Hospital Fund, and of the Hospital Sunday Fund. He is an enthusiastic collector of Japanese art, especially old lacquer work, and has printed an illustrated catalogue with forty autotypes and many wood engravings. He is a Fellow of the Royal Geographical and Linnean Societies, a Member of the Royal Institution



**SIR TREVOR LAWRENCE, BARONET, V.M.H., &c.**

PRESIDENT OF THE ROYAL HORTICULTURAL SOCIETY



and of the following clubs: the Carlton, the Burlington Fine Arts, the East India United Service, the Constitutional, and the Junior Constitutional.

From his earliest years Sir Trevor inherited from his mother a devotion to plants, gardens, and gardening, whilst from his father he probably derived that careful scientific observation and method which are so necessary to a successful cultivator and hybridist. He had many horticultural opportunities in India, where he created gardens in the mountains and grew a number of acclimatised seeds; whilst in the low hot valleys of the immediate district where he was so long stationed he met with numerous Orchids, *e.g.* *Saccolabiums*, *Ærides*, *Thunias* on the *Quercus incana*, &c., which he thus had the advantage of studying in their own native habitats. But it must not be supposed that Orchids in any way monopolise his attention. His love of plants is absolutely world wide and catholic, embracing not only the magnificent and the rare, but including all that is useful or beautiful in the realm of the vegetable kingdom. He was elected President of the Royal Horticultural Society in 1885, and has devoted himself ever since with a personal zeal (too seldom met with in presidents) to the furtherance of the best interests of the Society; and Fellows of the rising generation have little if any idea of to what a great extent the revival and present prosperity of the Society is due to the hard work, energy, wisdom, and tact of their President.

#### IS THE CHARACTER OF A VARIETY AFFECTED BY PROXIMITY TO ANOTHER VARIETY?

WE should be glad of some observations on this point. A Fellow writes, for example:—"Having four Apple trees in a row I have observed that the fruit of No. 3 somewhat resembles that of No. 2 on the side towards 2, being as a rule of a brighter colour and of a harder and firmer texture than it is on the other side of the tree. I am not aware whether it is recognised that the proximity of other Apple trees generally affects the character of the fruit." We do not think that this has been at all generally recognised, but it has been suggested that "pollination"—the fertilisation of the flower of one variety with the pollen of another—does sometimes affect the character of the fruit as well as (as it obviously does) of the seed. And if this be really so it would account for the case in point, the blossoms of tree No. 3 being fertilised with pollen from No. 2 on No. 2 side, but not on the other. We should like to hear of any careful and exact observations of this.

## THE TREASURER.

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PHILIP CROWLEY, Esq., F.L.S., F.Z.S., Treasurer of the Royal Horticultural Society, and Master of the Worshipful Company of Gardeners in the City of London, is the son of Abraham Crowley, and was born at Alton, in Hampshire, on August 28, 1837. He was educated privately, and since 1857 has been a partner in the brewing firm of Messrs. Crowley, of Alton and Croydon. In 1863 he married Anna, only daughter of the late John Warner, Esq., of Hoddesdon, and since 1869 has lived at Waddon House, Croydon. Very early in life he displayed a strong love for natural history, and possesses what is considered to be the largest and finest collection of birds' eggs in the world, including representatives of nearly 4,000 species; and one of the largest and most perfect collections of exotic butterflies. He has always taken great interest in Horticulture, and has tried many and various experiments in fruit-growing at Waddon, but the soil and atmospheric conditions have been against him. He has also cultivated Chrysanthemums on a large scale, as well as many Orchids and foliage plants. He has for many years been Chairman of the Fruit and Vegetable Committee of the Society, and on the resignation of Dr. Morris in 1890 he was appointed Treasurer of the Society with a seat on the Council. In 1899 he was elected Master of the Worshipful Company of Gardeners, and was unanimously re-elected for a second year of office in 1900.

As Treasurer of the Royal Horticultural Society he has paid unremitting attention to the finances of the Society, whose prosperity is in no small measure due to his thorough business aptitude and knowledge, and his constant and watchful care; and as Chairman of the Fruit and Vegetable Committee he has made himself equally respected and beloved by every member of the Committee, by his firm but gentle rule, and his unvarying courtesy and cordiality to all; and in both offices alike he has been remarkable for the ungrudging and unwearying amount of personal work he has bestowed, and for the almost infinitesimal amount of credit which he has been willing to accept—he has ever been one of those most kind of all kind helpers, viz., those who work their best and hardest and then make light of it. May the Royal Horticultural Society never be without such a Treasurer!



**PHILIP CROWLEY, ESQ., F.L.S., F.Z.S.,**  
TREASURER OF THE ROYAL HORTICULTURAL SOCIETY.  
AND  
MASTER OF THE WORSHIPFUL COMPANY OF GARDENERS.



## THE TEMPLE SHOW, 1900.

AMONG the distinguished visitors this year we noticed Her Majesty the Queen of Sweden, His Royal Highness the Prince of Wales, Her Royal Highness the Duchess of York, the Duchess of Devonshire, the Marchioness of Breadalbane, the Countess of Warwick, the Countess of Galloway, Lady Burton, Lord Wantage, Lord Amherst of Hackney, Lady Plowden, Lady Lawrence, the Speaker of the House of Commons, the Right Hon. Joseph Chamberlain, Lord Medway, Mr. Leopold Rothschild, Miss Balfour, Mrs. Creighton, &c. The Queen of Sweden most graciously sent a message through Lady Breadalbane expressing the very great pleasure she had experienced in seeing the flowers, and assuring the Council how much she was gratified with the attention which she had received.

## GREEN LICHEN, &amp;c., ON FRUIT TREES.

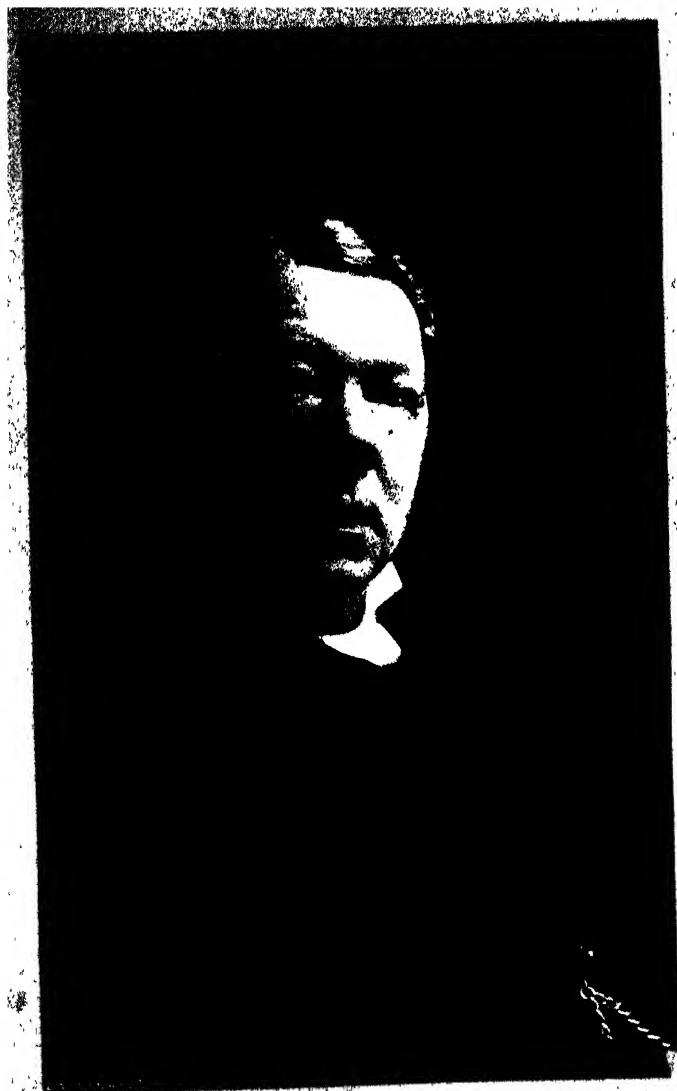
IN many gardens, after the fall of the leaf, the Apple and Pear trees especially may be noticed with a green powdery lichen completely covering the branches and stems, not only making them look very unsightly, but crippling the trees by preventing the bark from performing its proper functions. It would be difficult to say exactly what is the cause of the lichen, but too much damp in the air or the soil is certainly favourable to its increase, as also is stagnation of air, such as is often met with in overshadowed or overgrown gardens. The best remedy we have met with is to spray the trees when they are at rest (say in December or January) with a mixture of 1 lb. of caustic soda and 1 lb. of crude potash dissolved in 10 gallons of boiling or very hot water; and if the spraying is done before the mixture has become quite cold its action will be all the more thorough. A heavy spraying is not needed; it is only necessary to just wet the trees to thoroughly cleanse them. Great care is needed in using the spray; stout leather gloves should be worn, and something tied round the junction of coat sleeves and gloves to protect the wrists, for though the mixture is absolutely harmless to tree bark it burns the human skin badly. It is needless to add that the operator should be very careful to observe the way of the wind, so as not to get spray blown back in his face. This mixture will not only thoroughly cleanse the trees of lichen and such like, but it will kill any American blight (woolly aphis) that is still above ground, winter moth, and other such insect pests. It is also a capital wash for walls on which fruit trees are trained, in which case a rather forcible spray should be used so as to penetrate into the holes in the bricks and cracks in the mortar; but note that it must only be used as a spray when the trees are at rest in the winter, as the leaves will not stand it, but it is grandly effective against American blight if used with a brush on the trunks of the trees, in the summer, without letting it fall on the leaves.

## THE SECRETARY.

THE REV. W. WILKS, M.A., Vicar of Shirley, Surrey, and Secretary of the Royal Horticultural Society, was born at Ashford, in Kent, on October 19, 1843. In a recent communication to *The Garden*, Mr. Wilks says :—" My earliest recollections are connected with horticulture. I remember when I was only four years old my grandfather's devotion to plants, and particularly the pride which he took in the black and white grapes which he grew on a south wall in his garden at Charing, in Kent. The Rev. Joshua Dix, who was afterwards one of the leading spirits of the Royal Horticultural Society, was at that time Curate-in-charge of the parish of Charing, and all my early remembrances are mixed up with him and Mrs. Dix (as ardent a gardener as her husband), who were most intimate friends of my family. My father was also himself a keen gardener, his particular fancy being to try all the new Pears which France was at that time pouring into this country. About 1850, Joshua Dix moved up to London, and became officially connected with the Royal Horticultural Society (his portrait now hangs in the Council room) ; but his holidays were always spent in the Kent he loved so well ; and to our home garden at Ashford he used to bring, or send down, all the new plants and seeds sent out by the Society. Thus from my earliest years I have been immersed in gardens, and in active touch with the inner life of the Royal Horticultural Society.

" My school life served also to intensify my love of Nature, as I was educated under that great scientist and true Christian gentleman, Professor Charles Pritchard, until I proceeded to Pembroke College, Cambridge, in the year 1861. Having taken my degree in 1864, and after a couple of years spent amongst the flowers and the open hill country of Somersetshire, I accepted the curacy of Croydon, and was again fortunate in finding in my Vicar, Canon Hodgson, another enthusiastic and practical gardener.

" Up to the time of Joshua Dix's death I was by his kindness a frequent attendant at the Royal Horticultural Society's meetings, and in 1867 was elected a Fellow, and from that day to this I have never missed any one of the meetings, save from illness or absence from home. In 1879, Archbishop Tait moved me from Croydon to



**THE REV. WILLIAM WILKS, M.A.,**  
SECRETARY OF THE ROYAL HORTICULTURAL SOCIETY.  
VICAR OF SHIRLEY, SURREY



Shirley, where I at once began to cultivate and improve my garden, devoting myself principally to Roses, Pears, Poppies, Pæonies, Apples, Plums, Peaches, Nectarines, Daffodils, Strawberries, Rhododendrons, Flag Irises, Phloxes, Tulips, Hyacinths, Hardy Ferns, Lilies, Snowdrops, and Herbaceous plants in general. About 1880 I became a member of the Floral Committee; and was elected to a seat on the Council and appointed Honorary Secretary in 1886. The Society at this time was burdened with debt and consisted of only some 1,200 Fellows, many of whom were Life Fellows whose 'composition' money had long before been spent on costly buildings at Kensington. A resolute effort was made by the President and Council to save the life and continuity of the Society and to bring it back to a genuinely horticultural policy, with the result that probably never before has the position of the Society been so secure as it is at the present, the number of Fellows having steadily increased up to about 4,500 and its financial balance standing at more than £8,000.

"I am proud of my Poppies because (i) they are known all over the world, (ii) the seed has been given away freely to whosoever has asked, and (iii) they have given joy and delight to the poorest as well as the richest. They arose in this way: In 1880 I noticed in a waste corner of my garden abutting on the fields, a patch of the common wild Poppy of cornfields—*Papaver Rhæas*—one solitary flower of which had a very narrow white edging to the four petals. This one flower I marked and saved the seed of it alone. Next year, out of perhaps 200 plants, I had four or five on which *all the flowers* were white-edged. The best of these were marked and the seed saved, and so on for several years, the flowers all the while getting a larger infusion of white to tone down the red, until they arrived at quite a pale pink, and one plant absolutely pure white in the petals. I then set myself to change the black central portions of ~~the flowers~~, the anthers, stigmatic surface, and pollen, from black to yellow or white, and succeeded at last in obtaining a strain with petals varying from the brightest scarlet to pure white, with all shades of pink in between, and with all possible varieties of flakes and edged flowers, and having golden or white stamens, anthers, stigmatic surface, and pollen, and a white base to each petal. I am still working at them, in the hope of some day obtaining a true yellow *P. Rhæas*, and I have already arrived at distinct shades of salmon. The Shirley Poppies have thus been obtained simply by

selection and elimination. By 'selection' I mean the saving seed only from selected flowers; and by 'elimination,' the instant and total eradication of any plant that bears at all inferior flowers. To prevent these infecting the better ones, I am about among my flowers between three and four o'clock in the morning, so as to pull up and trample on and destroy the bad ones before the bees have a chance of conveying the pollen to others. It is the absence of this eliminating work which makes it so difficult (almost impossible) for any but an enthusiast to keep the strain true and pure. Double Poppies and flowers with black centres may be admired by some, but they are not Shirley Poppies. Shirley Poppies are (1) single, (2) always have a white base, with (3) yellow or white anthers and pollen, and (4) never have the smallest speck or suspicion of black in their whole composition. It should be encouraging to others working on similar lines, but with different subjects, to reflect that the gardens of the whole world are to-day furnished with Poppies which are the direct descendants of one single capsule of seed saved in the little Vicarage garden at Shirley so lately as August, 1880."

#### HELPING FRUIT TREES.

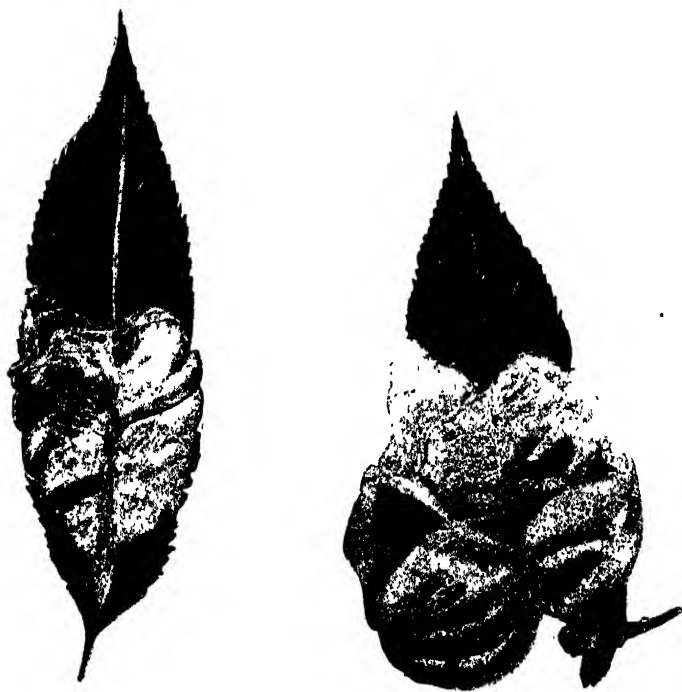
PEOPLE very often complain either (i) that their fruit trees grow but do not bear, or else (ii) that they don't make an atom of healthy growth, but are covered with such a profusion of bloom buds that they bring little if any fruit to perfection. In either of these cases, we strongly advise a trial of the following mixture: 1 part of Muriate of Potash and 2 parts of Superphosphate mixed well together and sprinkled over the surface of the ground, under and about the trees, at the rate of 3 oz. of the mixture to the square yard. After it has been sprinkled on the surface it should be well *raked* in (not dug). The dressing should certainly in any case be given in February, but we should advise giving weakly trees half a dressing in November as well.

This manure is found to have a wonderful effect in throwing trees into bearing and in helping weakly ones to make healthy growth.

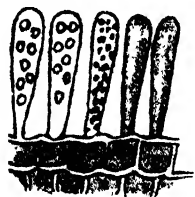
Many pruners absolutely prevent their healthy trees making bloom buds by pruning too hard. As a rough-and-ready general rule bush Apple and Pear trees should have all the side shoots of the branches cut back to two or three eyes, and the strong leading shoot of each branch have fully three-quarters of its total length left intact, in fact only just the thin top end taken off; for if more is taken off it simply throws all the side eyes into wood growth next year and prevents them developing fruit buds. It is still worse to see standard trees looking as if they had been gone over with shears. Plums are very impatient of pruning; the weakly side shoots should be nipped out or shortened well back with the finger and thumb nails in the summer.

## THE PEACH LEAF-CURL FUNGUS.

THE Countess of Selkirk writes:—"Last year our Peaches and Nectarines suffered dreadfully from the leaves curling up and dying.

THE LEAF-CURL FUNGUS (*EXOASCUS DEFORMANS*)

This year—1900—when they began to do the same thing the gardener put lime in water, carefully strained it through fine muslin, and syringed



SPORE CASES MAGNIFIED.

some trees with it, with the grand result that it entirely cured the disease, whilst the one tree which for experiment sake was not syringed was as bad with the disease as ever."

## REPORT ON PEAS AT CHISWICK, 1900.

FORTY-THREE stocks of Peas were received for trial in the Gardens, thirty-nine of which were sown on March 27, and the remaining four on March 29—the day they were received. The whole collection was grown on land that had been deeply trenched and liberally manured during the winter. All the stocks germinated well, and the cool, moist season suiting the Peas, all made excellent growth, entirely free from mildew or insect pests, and produced heavy crops. Two meetings were held by the Committee to examine them—on June 28 for the early varieties, and on July 10 for the later ones.

**F.C.C.** = First-class Certificate.

**A.M.** = Award of Merit.

1. Acme, **A.M.** July 5, 1898 (J. Veitch).—See Vol. XXII. part 2, page 204. Great crop. Ready for use June 22. Seeds wrinkled.

2. African Wonder (Cullen).—Height 15 inches; pods long, broad pointed, in pairs, averaging seven large moderately sweet Peas in a pod; haulm and pods deep green; growth sturdy; good crop. Ready for use June 28. Seeds wrinkled.

3. Alderman, **F.C.C.** July 10, 1900 (Barr).—See Vol. XXIII. part 2, page 163. Very heavy crop. Ready for use July 7. Seeds wrinkled.

4. Beatrice Harrison (Harrison).—See Vol. XXIII. part 2, page 163. Ready for use July 10. Seeds wrinkled.

5. British Empire (Johnson).—Height 3 feet; haulm and pods a peculiar deep green; like the old 'Emerald Gem,' but with larger pods and Peas. Ready for use July 10. Moderate crop. Seeds wrinkled.

6. Captain Cuttle (Barr), **A.M.** July 14, 1897.—Height 4 feet; pods long, slightly curved, in pairs, averaging nine large dark green Peas in a pod; fine flavour; haulm and pods deep green; sturdy growth; very heavy crop. Ready for use July 10. Seeds wrinkled.

7. Cotswold Hunt (Finney).—Same as No. 28.

8. Doris Harrison (Harrison).—Height 1 foot; pods medium height, slightly curved and pointed, averaging five large pale green Peas in a pod; fair flavour; haulm and pods deep green; growth sturdy; heavy crop. Ready for use July 6. Should prove a good market variety.

9. Duke of Cornwall, **A.M.** July 11, 1899 (Toogood).—See Vol. XXIII. part 2, page 163. Ready for use July 7. Seeds wrinkled.

10. Dwarf Hardy Marrowfat (Hurst).—See Vol. XXIII. part 2, page 164. Ready for use July 2.

11. Duke of York, **A.M.** June 6, 1898 (Toogood).—See Vol. XXIII. part 2, page 163. Ready for use July 6.

12. Edwin Beckett, **F.C.C.** July 8, 1900 (Beckett).—Height 4 feet; pods long, broad, pointed, in pairs, averaging eight very large dark green Peas in a pod; excellent flavour; haulm and pods deep green; growth very sturdy; very heavy crop. Ready for use June 26. Seeds wrinkled.

13. Emperor of Japan (Harrison).—See Vol. XXIII. part 2, page 164.

14. *Empress of India* (Barr).—Height 4 feet; pods long, slightly curved, pointed, averaging six moderately large Peas in a pod; good flavour; haulm dark green; pods pale green; growth sturdy; heavy crop. Ready for use June 26. Seeds wrinkled.

15. *Excelsior* (Webber).—Very similar in all points to 'Hertford Success,' which gained **A.M.** July 22, 1898. (See Vol. XXII. part 2, page 206.) Ready for use July 6.

16. *Fascination*, **A.M.** July 10, 1898 (Harrison).—See Vol. XXIII. part 2, page 164. A fine true stock, and immense crop of well-filled pods. Ready for use July 10.

17. *Fidler's No. 3* (Fidler).—Height 3 feet; pods moderately long, single, averaging five large pale Peas in a pod; pods and haulm pale green; flavour only fair; growth sturdy; heavy crop. Ready for use June 26. Seeds wrinkled.

18. *Fowler's King* (Fowler).—Height 6 feet; pods long, pointed, in pairs, averaging six deep green sweet Peas in a pod; haulm and pods dark green; growth very sturdy; heavy crop. Ready for use July 10. Seeds wrinkled.

19. *General Buller* (Sate).—Height 5 feet; pods medium length, straight, blunt, averaging eight large deep green Peas of poor flavour in a pod; haulm and pods dark green; growth very sturdy; heavy crop. Ready for use July 7. Seeds wrinkled.

20. *Lathom Pea* (Ashton).—Same as No. 28. Ready for use July 10.

21. *Late Queen*, **A.M.** July 10, 1900 (Barr).—Height  $3\frac{1}{2}$  feet; pods medium length, broad and blunt, averaging six very large delicious Peas in a pod; haulm and pods dark green; growth sturdy; very heavy crop. Ready for use July 10. Seeds wrinkled.

22. *Laxton's Rival* (Laxton).—Height 3 feet; pods long, broad, pointed, single, averaging eight large sweet deep green Peas in a pod; haulm and pods dark green; growth sturdy; heavy crop. Ready for use June 22. Seeds wrinkled.

23. *Lightning* (Barr).—Height 3 feet; pods small, in pairs, averaging five small green Peas in a pod; haulm weak, deep green; heavy crop. Ready for use June 18. Only valuable for its earliness. Seeds slightly wrinkled.

24. *London Market* (Carter).—Height 3 feet; pods medium length, straight, pointed, in pairs, averaging seven pale green sweetish Peas in a pod; haulm and pods deep green; growth sturdy; heavy crop. Ready for use July 10. Seeds slightly wrinkled.

25. *Lord Granby* (Harrison).—Same as No. 28. Ready for use July 5.

26. *Magnificent* (Hurst).—See Vol. XXIII. part 2, page 164. A very heavy crop. Ready for use July 6.

27. *Monarch*, **A.M.** June 28, 1900 (Sharpe).—Height 5 feet; pods long, broad, straight, pointed, in pairs, averaging nine large and very sweet dark green Peas in a pod; haulm and pods deep green; growth sturdy; very heavy crop. Ready for use June 28. Seeds wrinkled.

28. *Ne Plus Ultra* (Sage).—A very good selection of this excellent and popular late Pea, which is too well known to need description. Ready for use July 2.

29. Notts' Excelsior (Barr).—Height 15 inches; pods short, single, averaging four large palish green sweet Peas in a pod; haulm and pods dark green; growth sturdy; good crop. Ready for use June 25.

30. Peerless, **A.M.** July 10, 1900 (Barr).—Height 3 feet; pods very long, straight, in pairs, averaging ten large dark green Peas in a pod; flavour excellent; haulm and pods very dark green; growth sturdy; great crop. Ready for use July 7. Seeds wrinkled.

31. Royal Standard (Smith).—Same as No. 3. Ready for use July 2.

32. Standard, **A.M.** June 28, 1900 (Sharpe). This variety appears to be a dwarf form of Alderman (No. 3), and earlier in coming into use. Ready for use June 26.

33. Stanley, Extra Selected (Sharpe).—Height 2 feet; pods long and slightly curved, pointed, usually single, averaging seven medium-sized, palish green sweetish Peas in a pod; haulm and pods dark green; growth sturdy; good crop. Ready for use July 2. Seeds wrinkled.

34. The Briton (Deal). Height 2½ feet; pods long, broad, pointed, single, averaging seven large deep green Peas of fair flavour in a pod; haulm and pods deep green; growth sturdy; moderate crop. Ready for use July 10. Seeds wrinkled.

35. The Herald (Barr).—Height 15 inches; pods long, slightly curved, single, averaging seven large pale green Peas of moderate flavour in a pod; haulm dark; pods pale green; growth sturdy; good crop. Ready for use July 2. Seeds wrinkled.

36. The Major, **A.M.** June 28, 1900 (Webber).—See Vol. XXIII. part 2, page 165. Ready for use June 26.

37. Telephone (Barr).—Height 5½ feet; pods long, broad, pointed, straight, in pairs, averaging nine large sweet pale green Peas in a pod; haulm and pods pale green; growth sturdy; heavy crop. Ready for use July 2.

38. Thousandfold (Toogood).—See Vol. XXIII. part 2, page 165. Ready for use July 10.

39. Tremendous (Toogood).—See Vol. XXIII. part 2, page 165. Ready for use June 25.

40. Unrivalled (Toogood).—See Vol. XXIII. part 2, page 165. Ready for use July 9.

41. Victoria (Toogood).—Same as No. 21.

42. Veitch's Favourite (J. Veitch).—Height 4 feet; pods long, slightly curved, pointed, in pairs, averaging eight large sweet pale green Peas in a pod; haulm deep green; pods pale green; sturdy growth; heavy crop. Ready for use July 2. Seeds wrinkled.

43. Veitch's Second Early (J. Veitch).—Height 2 feet; pods short, pointed, in pairs, averaging six large pale green Peas of fair flavour in a pod; haulm dark green; pods paler; heavy crop produced at the top of the sturdy haulm. Ready for use July 2.

## REPORT ON CAULIFLOWERS AT CHISWICK, 1900.

A COLLECTION of Cauliflower seeds was sent for trial early in 1899, and although the germination was good and the plants put out on rich soil and frequently watered, the whole collection buttoned prematurely, and was of no value for trial purposes. All the stocks were sown again on March 30, 1900, in cold frames, and when large enough to handle were planted out on deeply worked and well-manured soil. The season being comparatively moist and cool, the whole collection made excellent growth, and the trial proved satisfactory.

**F.C.C. = First-class Certificate.**

1, 2, 3. Autumn Giant, **F.C.C.** November 2, 1870 (Watkins & Simpson, J. Veitch).—Foliage long, broad, and deep glaucous green; robust habit; heads very large, firm, and creamy white. Ready for use August 11. A well-known valuable variety, standing heat and drought better than any other sort.

4. Danish Early (Hensen).—Same as No. 5. Ready for use July 9.

5. Dwarf Erfurt (Heinemann).—Foliage of medium size, pointed; pale green; plant dwarf and sturdy; heads of moderate size, close, firm, and pure white. Ready for use July 5. The best early variety.

6. Early Dwarf Autumn Giant (Watkins & Simpson).—Same as Nos. 1, 2, 3.

7. Early Dwarf Erfurt (J. Veitch).—Same as No. 5.

8. Early Eclipse (Watkins & Simpson).—Very similar to Nos. 1, 2, 3.

9. Early London (Watkins & Simpson).—Foliage rather large, dark green, curving inwards and partly protecting the heads; heads over medium size, firm, creamy white. Ready for use July 14. A fine true stock of this old favourite.

10. Early Snowball (Watkins & Simpson). A very good selection of No. 5 with broader leaves. Ready for use July 11.

11. English Early London (Watkins & Simpson).—Same as No. 9.

12. Giant Imperial (Watkins & Simpson).—Very similar to No. 9. Ready for use July 14.

13. Heinemann's Algiers (Heinemann).—Same as Nos. 1, 2, 3. Stock mixed. Ready for use August 8.

14. Her Majesty (Toogood).—A good dwarf and later selection of No. 9. Ready for use July 11.

15. Improved Early Dwarf Erfurt (J. Veitch).—An excellent selection of No. 5.

16. Lenormand (Toogood).—Same as No. 14.

17. Midsummer Day (R. Veitch).—A selection of No. 5.

18. Pearl (J. Veitch).—Foliage of moderate size, pointed, deep green; heads very white and firm, nearly covered by the leaves; plants very dwarf and sturdy. Ready for use August 9. A fine true stock.

19. Timely (Toogood).—Same as No. 5.

20. Triumph (Toogood).—An inferior form of Nos. 1, 2, 3.

21. Walcheren (Watkins & Simpson).—Same as No. 9.

## REPORT ON EARLY POTATOS AT CHISWICK, 1900.

FORTY-THREE stocks of early Potatos were received for trial and planted April 19, and on May 19 the same varieties were planted on the same quarter as the first planted, to prove the difference, if any, between early and late planting of early Potatos. The experiment was very interesting, and proved that planting so late as May 19 was decidedly wrong, as not only were the tubers of the late-planted ones small and few in number, but also much more susceptible to climatic influences, as many of them commenced to grow out and spear, while the same varieties planted a month earlier were perfectly good, and exhibited no signs of spearing or growing out. The whole collection made excellent growth, and with two exceptions all the early planted ones produced good crops free from disease.

The Fruit and Vegetable Committee examined the collection on four occasions, viz. June 28, July 10, August 3, and August 16. The following varieties, by reason of their heavy crops, were selected for cooking to test their quality, viz.:-

Beauty of Hebron	Harbinger
Cigarette	Improved Ashleaf
Denbigh Castle	May Queen
Earliest of All	Ninetyfold
Early Perfection	Pioneer Earliest Kidney
Early Peter	Ringleader
Early Puritan	Round Seedling
General Roberts	Sharpe's Victor
Grimston Ashleaf No. 1	Sir John Llewelyn
Grimston Ashleaf No. 2	Sunbeam

**F.C.C.** = First-class Certificate.

**A.M.** = Award of Merit.

1. A 1 (Sutton).—Round, yellowish white skin; eyes rather deep; heavy crop, free from disease; haulm short and moderately robust. Ready for use June 27.

2. Ashleaf (Sutton).—Kidney, tapering at the end; moderate crop, free from disease; haulm short and sturdy. An excellent and well-known variety, and still one of the best. Ready for use July 2.

3. Beauty of Hebron, **A.M.** August 14, 1900 (J. Veitch).—Kidney, pale pink; eyes shallow; large; very heavy crop, free from disease; moderate haulm. Ready for use July 2. One of the best when cooked.

4. Chester Favourite (Dicksons).—Round, white, russety; eyes shallow; large; heavy crop, free from disease; haulm moderate and sturdy. Ready for use July 10.

5, 6. Cigarette (Kerr, Barr).—Round, white; eyes shallow; medium size; heavy crop, free from disease; haulm tall and robust. Ready for use August 14.

7. Cole's Favourite, **F.C.C.** August 20, 1885 (J. Veitch).—Kidney

white; eyes full; large; heavy crop, free from disease; haulm moderate, robust. Ready for use July 9.

8. Denbigh Castle, **F.C.C.** July 10, 1900 (Sharpe).—Kidney, white; eyes full; large; good crop, free from disease; haulm short and sturdy. Ready for use June 28. This variety was excellent when cooked.

9. Diamond Jubilee (Dicksons).—Round, white; eyes deeply set; large; heavy crop, free from disease; haulm tall and robust. Ready for use August 13.

10. Earliest of All (Penton).—Kidney, white; eyes full, handsome; rather small; heavy crop, free from disease; haulm short and moderately robust. Ready for use June 28.

11. Early Peter, **A.M.** July 25, 1899 (Bradley).—See Report, vol. xxiii., Part 2, page 170.

12. Early Perfection (R. Veitch).—Long kidney, pale pink, of the Beauty of Hebron type; eyes shallow; heavy crop, free from disease; haulm moderate. Ready for use July 2.

13. Early Puritan, **A.M.** August 16, 1900 (J. Veitch).—Kidney, white; eyes full; large; very heavy crop, free from disease; haulm short and robust. Ready for use July 11.

14. Early Queen (Dicksons).—Kidney, white, tapering to a thin end as in the Ashleaf; large; eyes shallow; heavy crop, free from disease; haulm short and robust. Ready for use July 9.

15, 16. Early Ringleader, **A.M.** July 10, 1900 (Sutton, Dicksons).—Kidney, white; eyes full, large; very heavy crop, free from disease; haulm very short and sturdy. Ready for use June 28.

17. English Beauty (J. Veitch).—Kidney, white; eyes full; light crop, free from disease; haulm short and weak. Ready for use July 3.

18, 19. General Roberts (Kerr, Barr).—Round, white, handsome; eyes full; very heavy crop, free from disease; haulm very tall and robust. Ready for use August 3.

20. Grand Monarch (Dicksons).—Round, white; eyes full; light crop, free from disease; haulm tall and robust. Ready for use August 4.

21. Grimston Ashleaf No. 1 (Clayton).—A very good selection of No. 2. Ready for use July 3.

22. Grimston Ashleaf No. 2 (Clayton).—Kidney, white; eyes full; handsome, large; heavy crop, free from disease; haulm short and robust. Ready for use June 29.

23. Harbinger, **A.M.** August 5, 1897 (Sutton).—Round, white; eyes full; medium size; very heavy crop, free from disease. Ready for use June 28.

24. Improved Ashleaf (J. Veitch).—A good selection of the old Ashleaf No. 2.

25. Improved Early Dwarf-top Ashleaf (Dicksons).—Same as Nos. 2, 21, and 24.

26. May Queen (Sutton).—Long kidney, white; eyes full; very heavy crop, much diseased; haulm moderate and robust. Ready for use July 2.

27. Myatt's Ashleaf (J. Veitch).—A very fine stock of this old favourite. Ready for use July 4.

28. Ninetyfold, **A.M.** July 10, 1900 (Sutton).—Kidney, white; eyes full; large, handsome; very heavy crop, free from disease; haulm moderate and robust. Ready for use July 10.

29. Pioneer Earliest Kidney, **A.M.** August 14, 1900 (Dicksons).—Flat kidney, white; eyes full; large, handsome; heavy crop, free from disease; haulm short and moderately robust. Ready for use July 9.

30. Pride of Chester (Dicksons).—Kidney, white; eyes full; large; heavy crop, free from disease; haulm tall and very robust. Ready for use August 3.

31. Plentiful (Dicksons).—Round, red; eyes deep; large; good crop, free from disease; haulm tall and robust. Ready for use August 7.

32. Prizetaker (J. Veitch).—Long kidney, white; eyes shallow; heavy crop, free from disease; haulm tall and robust. Ready August 9. A variety under this name from Mr. Fenn received a **F.C.C.** August 19, 1881. This variety is very similar to No. 40.

33. Prizewinner (Barr).—Round, white; eyes full; large; moderate crop, free from disease; haulm tall and robust. Ready for use August 8.

34. Professor Walker (Barr).—Round, white; eyes full; rather small; heavy crop, free from disease; haulm tall and robust. Ready for use August 15.

35. Round Seedling (Dicksons).—Round, white tinged with pink; eyes full; large; moderate crop, free from disease; haulm medium. Ready for use July 19.

36. Royal Standard (Dicksons).—Long kidney, white; eyes shallow; very heavy crop, free from disease; haulm tall and robust. Ready for use August 1.

37. Selected Early Old Ashleaf (Barr).—Same as No. 2.

38, 39. Sharpe's Victor, **A.M.** August 14, 1900. As a garden variety (Sharpe, J. Veitch).—Pebble-shape, white; eyes full; handsome; flesh yellow; very heavy crop, free from disease; haulm short and robust. Ready for use July 2. This variety had already received an **A.M.** on April 25, 1893, as a forcing variety.

40. Sir John Llewelyn, **A.M.** September 11, 1900 (Harris).—Kidney, white; eyes shallow; handsome; the heaviest crop in the collection, free from disease; haulm tall and robust. Ready for use August 16.

41. Sunbeam (Gott).—Long kidney, white; eyes shallow; heavy crop, large, free from disease; haulm tall and robust. Ready for use July 10. Stock slightly mixed.

42. The Dickson (Dickson).—Kidney, white; eyes shallow; uneven in size; moderate crop, free from disease; haulm tall and robust. Ready for use August 3.

43. The Major, **A.M.** September 6, 1898 (J. Veitch).—See Vol. XXII. part 2, page 225. Ready for use August 16.

## REPORT ON LETTUCES AT CHISWICK, 1900.

EIGHT stocks of Lettuce were received for trial in the Gardens, all of which were sown in cold frames on March 5. In every case the germination was good, and the seedlings when very small were planted out eighteen inches apart on a west border that had been previously well manured. All the stocks made excellent growth, and were remarkable for the purity of stock and freedom from "bolting." The whole of the collection was sent by Messrs. Harrison, Leicester. Two meetings were held by the Committee to examine them, viz., June 28 and July 10.

**A.M.** = Award of Merit.

× × × = Highly Commended.

1. **Crimson Beauty.**—Foliage very large and spreading; heavily margined and tinted with crimson; tender but somewhat bitter in flavour. This variety does not form hearts, but would be very pretty in the salad bowl. Stands well without running to seed. Ready for use June 28. Cabbage.

2. **Harrison's Emerald,** × × × July 10, 1900. Foliage moderately large and spreading; hearts large, very firm, crisp, and of good flavour. A handsome dark green variety, but after a few dull days the tips of the leaves are subject to scalding. Stands well without running to seed. Ready for use June 28. Cabbage.

3. **Harrison's King,** × × × July 10, 1900 (votes 6 for, 3 against). This is very like a pale form of 'Malta.' Stands well without running to seed. Ready for use July 3. Cabbage.

4. **Improved All The Year Round,** **A.M.** June 28, 1900. A very fine selection of the old well-known 'All The Year Round,' and still one of the best. Ready for use June 24. Cabbage.

5. **Lord Leicester.**—Foliage immense; dark green; hearts large and firm, of fair flavour. 90 per cent. of the plants failed to heart, and ran quickly to seed as compared with others. Ready for use June 27. Cabbage.

6. **New Fern-leaved.** Foliage small; compact; pale green; hearts solid, crisp, and small in size. Ready for use June 27. Cabbage.

7. **Royal Malta,** **A.M.** August 13, 1895. A very fine stock of this popular large Cabbage variety, which stands drought remarkably well, and continues crisp and good for several weeks after coming into use. Ready for use June 28.

8. **Up to Date.**—The Committee decided this to be Paris Green Cos. Ready for use July 5.

## REPORT ON TOMATOS AT CHISWICK, 1900.

SEVENTY-SEVEN stocks of Tomatos were grown for trial, all being sown on April 3. Two plants of each stock were grown on and fruited in 10 in. pots under glass; and a row of each planted out on a warm south border to test their merits for open-air culture. The whole collection made good growth, both inside and out, and cropped well; and with the exception of a few fruit outside being attacked by the "black spot" they were free from disease. The Committee examined the collection on two occasions, viz. August 16 and August 30.

**F.C.C.** = First-class Certificate.

**A.M.** = Award of Merit.

× × × = Highly Commended.

1. A 1 (Sutton).—Medium size; deep, round, smooth, good form; deep scarlet; averaging seven fruits to a cluster, solid, and of good flavour. Heavy crop inside and outside. Ready outside August 9.

2. Advancer (R.H.S.).—Large; flat round, smooth; deep red; averaging four fruits to a cluster; not a heavy cropper inside or outside. Ready outside August 10.

3. Beauty of Sark (Pipon).—Very large; flattish round, smooth; deep crimson; averaging three fruits to a cluster, solid, and of fair flavour. Moderate crop inside; heavy crop outside. Ready outside August 9.

4. Blenheim Orange, **A.M.** September 20, 1892 (R.H.S.).—Large; round, smooth; good form; bright yellow faintly flushed with red; solid; fine flavour; averaging four fruits to a cluster inside and a good crop, but very light crop outside.

5. Brook's Freedom (R.H.S.).—Very similar to Chemin Rouge.

6. Brunstead Seedling (Bird).—Medium size; deep round, smooth, with a sharp nipple at the point; deep crimson; solid; fine flavour; averaging five fruits to a cluster. Light crop inside; heavy crop outside. Ready outside August 7.

7, 8. Champion (Dobbie, R.H.S.).—Medium size; deep round, smooth; deep scarlet; averaging five inside and nine outside to a cluster; heavy crop. An excellent variety of Chemin Rouge type. Ready outside August 4.

9. Cheal's Prolific (Cheal).—Large; flat, corrugated; deep scarlet; averaging eight fruits to a cluster; moderately firm; good flavour. Very heavy crop inside and outside. Ready outside August 6.

10. Chemin Rouge, × × × as an outside variety August 30, 1900 (R.H.S.).—A well-known popular variety, which produced heavy crops both inside and outside.

11, 12. Cherry Ripe, **A.M.** July 25, 1899 (Dobbie, R.H.S.).—See vol. xxiii. Part 3, page 167. Heavy crops inside and outside. Ready outside August 6.

13. Cherry Shape (R.H.S.).—Small; round, smooth, cherry-like; averaging ten fruits in a cluster; not good in flavour. Moderate crop inside, of no value outside.

14. Chiswick Dessert, **A.M.** July 31, 1896 (R.H.S.).—Rather small; round, smooth; scarlet; averaging eight fruits in a cluster; solid; of fine flavour. Heavy crop inside, of no value outside.

15. Chiswick Peach, **F.C.C.** August 15, 1899 (R.H.S.).—Below medium size; round, smooth; lemon yellow and covered with a fine down; averaging seven fruits in a cluster; solid; and of delicious flavour for dessert. Heavy crop inside, but very light outside.

16. Corbett's Excelsior, **A.M.** June 11, 1895 (Normanby).—Large; round, smooth; scarlet; averaging seven fruits in a cluster; solid; good flavour. Heavy crop inside and outside. Ready outside August 7.

17. Duke of York, **F.C.C.** July 23, 1895 (Ryder).—Large; flattish, round, smooth; scarlet; averaging three fruits in a cluster; solid; fair flavour. Moderate crop inside, light crop outside. Ready outside August 9.

18. Early Marvel (Toogood).—See Vol. XXIII. part 2, page 167. Heavy crop outside, many of the fruit corrugated. Ready outside August 10.

19. Early Prolific (Barr).—Large; round, smooth; scarlet; averaging seven in a cluster; solid; good flavour. Heavy crop inside and outside. Ready outside August 11.

20, 21, 22. Early Ruby (Watkins & Simpson, Barr, R.H.S.).—Medium size, uneven; some fruits smooth, others corrugated, particularly outside; deep red; averaging five fruits in a cluster. Heavy crops inside and outside. Ready outside August 8.

23. Early Evesham (Watkins & Simpson). Medium size, corrugated; red; averaging seven fruits in a cluster; moderately firm; good flavour. Heavy crops inside and outside. Ready outside August 9.

24. Flying Dutchman (Watkins & Simpson).—Large; flat, round, smooth; deep crimson; averaging five fruits in a cluster; moderate crops inside and outside. Ready outside August 10.

25. Fordhook Fancy (Atlee Burpee).—See Vol. XXIII. part 2, p. 167. Moderate crop outside. Ready outside August 17.

26. Frogmore Selected, **F.C.C.** April 24, 1894;  $\times \times \times$  August 30, 1900, as an outdoor variety (J. Veitch).—Medium to large; deep round, smooth; handsome; scarlet; averaging six fruits in a cluster; solid; good flavour. Heavy crops inside and outside. Ready outside August 9.

27. Golden Drop (Dobbie).—Same as Golden Nugget. (See Nos. 30, 31.)

28, 29. Golden Jubilee, **F.C.C.** May 26, 1897 (J. Veitch, Dobbie).—Large; round; deep yellow slightly suffused with red; smooth; handsome; averaging five fruits to a cluster; solid; fine flavour. Heavy crop inside, light crop outside. Ready outside August 10.

30, 31. Golden Nugget, **F.C.C.** August 14, 1894;  $\times \times \times$  as an outdoor variety, August 30, 1900 (Sutton, R.H.S.).—Small; roundish oval, smooth; bright yellow; averaging eight fruits in a cluster; solid; fine flavour. Heavy crops both inside and outside. Ready outside August 10.

32. Gilbert's Surpasse (Divers).—Medium size; deep round, smooth; scarlet; averaging four fruits in a cluster; solid; fair flavour. Heavy crop inside, moderate crop outside. Ready outside August 10.

33. Golden Princess (R.H.S.).—Medium size; round, smooth; bright

yellow; averaging five fruits in a cluster; solid; good flavour. Heavy crop inside, light crop outside. Ready outside August 11.

34. Golden Queen, **F.C.C.** August 19, 1884 (Toogood).—See Vol. XXIII. part 2, p. 167. Light crop outside. Ready outside August 9.

35. Good Gracious (Webber).—Large; round, smooth; deep red; averaging five fruits in a cluster; solid; fair flavour. Moderate crop inside, heavy crop outside, but rather rough. Ready August 11.

36. Ham (Green Favourite, **F.C.C.** September 16, 1887 (R.H.S.).—Large; flattish round, smooth; deep scarlet; averaging seven fruits in a cluster; solid; good flavour. Heavy crop both inside and outside. Ready outside August 6.

37. Hillside Comet (Watkins & Simpson). Same as The Comet.

38. King's Seedling,  $\times \times \times$  August 30, 1900 (Newport).—Medium size; deep round, smooth; bright red; averaging six fruits in a cluster; solid; good flavour. Heavy crop both inside and outside. A free-bearing variety of the Chemin Rouge type.

39. Klondyke (Taylor).—Very similar to The Comet.

40. Laird's Supreme (Laird).—Large; deep round, smooth; scarlet; averaging six fruits in a cluster; solid; fair flavour. Heavy crop inside and outside. Ready outside August 4.

41. Laxton's Prolific (Laxton).—Large; flat, corrugated; scarlet; averaging eight fruits in a cluster; solid; good flavour. Very heavy crops inside and outside. Ready outside August 9.

42. Leicester Prolific (Harrison).—Medium size; round, smooth; scarlet; averaging six fruits in a cluster; solid; very good flavour. Heavy crops inside and outside. Ready outside August 15.

43. Mulgrave Prolific (Corbett).—Large; flat, round; usually smooth; averaging seven fruits in a cluster; solid; good flavour. Heavy crops inside and outside. Ready outside August 12.

44. Nield's Seedling, **A.M.** July 31, 1896 (Barr).—Medium to large; round, smooth; scarlet; averaging six fruits in a cluster; solid; very good flavour. Very heavy crop inside and outside. Ready outside August 11.

45, 46. Open Air (Laxton. Barr).—Large; flat, corrugated; scarlet; averaging four fruits in a cluster; moderately solid; poor flavour. Light crops inside and outside. Ready outside August 9.

47. Pear-shaped (R.H.S.).—Small; pear-shaped, smooth; bright scarlet; averaging ten fruits in a cluster; acid flavour. Very heavy crop inside and outside. Ready outside August 9.

48. Perfection (Sutton).—Large; flattish round, smooth; scarlet; averaging three fruits in a cluster; solid; fair flavour; moderate crop inside and outside. Ready outside August 19.

49. Pointing's Trophy (Watkins & Simpson).—Very similar to Chemin Rouge.

50. Ravenscroft's Red,  $\times \times \times$  August 30, 1900 (Ravenscroft).—Large; round, smooth; scarlet; averaging six fruits in a cluster; solid; good flavour; very heavy crop inside and outside. Ready outside August 14.

51. Royal Sovereign, **A.M.** July 26, 1892 (Gilbert). See Vol. XXIII. part 2, page 168. Of little value outside. Ready outside August 29.

52, 53. St. Simon, **A.M.** September 6, 1898 (Wilson, R.H.S.).—

Medium size; round, smooth; handsome; scarlet; averaging five fruits in a cluster; solid; very good flavour; heavy crops inside and outside. Ready outside August 9.

54. Selected Conference (Dobbie).—A good stock of Conference.

55. Sensation (R.H.S.).—Large; round, smooth; bright red; averaging six fruits in a cluster; solid; good flavour; heavy crops inside and outside. Ready outside August 7.

56, 57, 58. Stirling Castle, **A.M.** September 6, 1898 (Barr, Laird, R.H.S.).—Medium size; round, smooth; averaging eight handsome scarlet fruits in a cluster; solid; very good flavour; very heavy crops inside and outside. Ready outside August 5.

59. Supreme,  $\times \times \times$  August 30, 1900 (Holmes).—Medium size; round, smooth; bright red; averaging nine fruits in a cluster; solid; very good flavour; very heavy crop inside and outside. Ready outside August 4.

60. Sutton's Dessert, **F.C.C.** August 14, 1894 (Sutton).—Small; round, smooth; handsome; scarlet; averaging eight fruits in a cluster; solid; excellent flavour; heavy crop inside, light crop outside. Ready outside August 19.

61. The Comet, **A.M.** July 25, 1899;  $\times \times \times$  August 30, 1900, as an outside variety (R.H.S.). See Vol. XXIII. part 2, page 167.—Very heavy crop outside, and one of the earliest and best. Ready outside August 2.

62. The Conference, **F.C.C.** August 13, 1889 (R.H.S.). Medium size; round, smooth; bright red; averaging six fruits in a cluster; solid; good flavour; heavy crops inside and outside. Ready outside August 2.

63. The Peach (R.H.S.).—Medium size; round, smooth; covered with a fine down; dull red or terra cotta; averaging five fruits in a cluster; solid; good flavour; moderate crop inside, of no value outside.

64. Tait's Seedling (Tait).—Large; round, smooth; deep red; averaging six fruits in a cluster; solid; fair flavour; heavy crops inside and outside. Ready outside August 17.

65. The Cropper,  $\times \times \times$  August 30, 1900 (Cutbush).—See Vol. XXIII. part 2, page 168. Heavy crops inside and outside. Ready outside August 5.

66. The Polegate (R.H.S.).—Large; flattish round, smooth; scarlet; averaging four fruits in a cluster; solid; fair flower; moderate crop inside and outside. Ready outside August 18.

67. Thick-fleshed (J. Veitch).—Medium size; round, smooth; scarlet; averaging seven fruits in a cluster; solid; good flavour; moderate crop inside, heavy crop outside. Ready outside August 9.

68. Tip-Top (Toogood).—See Vol. XXIII. part 2, page 168. Heavy crop outside. Ready outside August 9.

69. Tit-Bits,  $\times \times \times$  August 30, 1900 (Watkins & Simpson).—See Vol. XXIII. part 2, page 168. Very heavy crop outside. Ready outside August 7.

70. Tuckwood Cross (Holmes).—Medium size; round, smooth; scarlet; averaging six fruits in a cluster; solid; very good flavour; heavy crops inside and outside. Ready outside August 8.

71. Turner's Prolific (R.H.S.).—Large; corrugated; deep red; averaging five fruits in a cluster; moderately solid; good flavour; heavy crops inside and outside. Ready outside August 16.

72. Unnamed (Gibson).—Very similar to Duke of York.

73. Veitch's Glory,  $\times \times \times$  August 30, 1900 (R. Veitch).—Large; round, smooth; handsome; deep scarlet; averaging nine fruits in a cluster; solid; fine flower; very heavy crops inside and outside. Ready outside August 7.

74. Webber's Fine Stock (Webber).—Same as No. 64.

75. Wonderful (Toogood).—See Vol. XXIII. part 2, page 168. Heavy crop outside. Ready outside August 6.

76. Wonder of Italy,  $\times \times \times$  August 30, 1900 (Tait).—Small; oval, smooth; scarlet; bearing enormous clusters of fruit, usually sixty and upwards in a cluster; fair flavour; great cropper inside and outside. Ready outside August 29. This variety was sent to Chiswick by Messrs. Dammann, Naples, in 1896, under the name of 'Semper Fructifera.'

77. Young's Eclipse, A.M. July 31, 1896,  $\times \times \times$  August 30, 1900; as an outside variety (Young).—Medium size; round, smooth; scarlet; averaging five fruits in a cluster; solid; good flavour; heavy crops inside and outside. Ready outside August 15.



## DWARF AND RUNNER BEANS, CHISWICK, 1900.

EIGHT stocks of Beans were received for trial in the Gardens, which were sown on an open quarter on May 12, in rows wide apart, and thinly in the rows. All the stocks germinated well, and were examined by the Fruit and Vegetable Committee on two occasions, viz. August 3 and August 16.

**Awards Recommended :—**

**A.M.** = Award of Merit.

× × × = Highly Commended.

1. Bountiful (Henderson).—Growth moderately dwarf; foliage large; pods long, straight, handsome; heavy crop. Ready for use July 18. Seeds pale dun.

NOTE.—At one time it was thought that 'Aigburth Wonder' was synonymous with this variety. The mistake arose from some seed having become accidentally mixed. 'Aigburth Wonder' is, however, a white-seeded variety, whereas the seeds of 'Bountiful' are a pale dun colour. 'Aigburth Wonder' is not yet in commerce.

2. China Yellow? (J. Veitch).—Growth moderately dwarf; foliage small; pods of medium length, thick and fleshy, straight and green; very heavy crop. Ready for use July 23. Seeds white.

3. Early Favourite, **A.M.** April 27, 1897, as a forcing variety; × × × August 3, 1900, as an outdoor variety (J. Veitch).—Growth dwarf and compact; foliage moderate; pods long, broad, straight, and fleshy; very heavy crop. Ready for use July 17. Seeds speckled.

4. Early Wonder (J. Veitch).—See Vol. XXIII., part 2, page 161.

5. Golden Skinless (J. Veitch).—Growth dwarf; foliage small; pods long, curved, thick, and fleshy; of a beautiful golden colour; heavy crop. Ready for use July 21. Seeds pale dun.

6. Veitch's Hybrid (J. Veitch).—From Scarlet Runner × Dwarf Bean. Growth vigorous and rather tall; foliage moderate; pods long, broad, straight, and fleshy; almost like a Scarlet Runner; a free continuous bearer; heavy crop. Ready for use August 3. Seeds purple marked with black. This variety will prove valuable for late supplies.

7. Princess (J. Veitch).—A runner; foliage small; pods small, and produced in great numbers. A valuable French Bean bearing heavy crops continuously. Ready for use August 3. Seeds purplish.

8. Stringless White (Ruys).—A runner; foliage large; pods of great length, wide, straight, lacking in flesh, and of little value; light crop. Ready for use August 16. Seeds white.

## TULIPS AT CHISWICK, 1900.

A COLLECTION of 224 stocks of Tulips was planted in ordinary soil late in the autumn of 1899. The collection occupied the whole of the beds (forty) on the north side of the long vinery between the Paxton Greenhouse and the west wall near the Council-room. The oblong and circular beds on either side of the centre walk leading to the big vinery were also filled with bulbs (twelve of each variety), the whole creating a brilliant effect from about April 23 to the early part of June, and were greatly admired by visitors to the Garden, many of whom came from very long distances to see them. The Floral Committee examined the collection on five occasions, and recommended Awards of Merit to two varieties and highly commended sixty-four others.

A.M. = Award of Merit.

× × × = Highly Commended.

## I.—EARLY SINGLE FLOWERING TULIPS

(April 18 to May 3).

1. Adeline (Hogg & Robertson).—Height 4 inches; flowers of good form, rosy carmine with a yellow centre. In flower April 26 to May 16.

2. Admiral Renier, × × × May 2, 1900 (Hogg & Robertson).—Height 10 inches; flowers large, goblet-shaped, with broad, substantial petals, bright rose-pink striped with white; yellow centre. In flower May 1 to May 19.

3. Alba regalis (Jones).—Height 10 inches; flowers of good shape borne on stout stems; white faintly edged with pale yellow, and occasionally streaked with orange; yellow centre. In flower May 1 to May 23.

4. Artus (*syn.* Garibaldi) (Jones).—Height 8 inches; flowers rich scarlet with a conspicuous yellow centre, and touched with rosy carmine on the exterior of the petals. In flower May 1 to May 16.

5. Bacchus, × × × April 26, 1900 (Hogg & Robertson, Jones).—Height 6 inches; flowers with sharply pointed petals, deep crimson stained with yellow in the centre; very showy and useful as an edging to taller growers. In flower April 21 to May 14.

6. Bizard Pronkert (Hogg & Robertson).—Height 1 foot; flowers large, golden yellow streaked and marked with crimson. In flower April 26 to May 23.

7. Brutus Golden (Hogg & Robertson).—Height 7 inches; flowers orange-scarlet streaked and flushed with deep yellow. In flower May 2 to May 21.

8. Californie (Hogg & Robertson).—Height 6 inches; flowers canary yellow, with rather pointed thin petals; not so good as No. 41. In flower April 23 to May 15.

9. Canary Bird (Hogg & Robertson).—Height 7 inches; rich yellow flowers of medium size borne on slender stems, the petals narrow and sharply pointed. In flower April 26 to May 10.

10. *Cerise Gris de Lin*,  $\times \times \times$  May 9, 1900 (Hogg & Robertson, Jones).—Height 7 inches; flowers rather small, of excellent shape and substance; lake shading to fawn and cream-white, with a yellow centre; grand for margins, and should always be planted in a sunny position. In flower May 1 to May 22.

11. *Chrysolora* (Jones).—Height 8 inches; flowers of good form and substance, deep golden yellow; grand for margins and for massing. In flower April 23 to May 14.

12. *Claremont Golden* (Hogg & Robertson).—Height 8 inches; flowers large, orange scarlet flushed with rosy purple and streaked with yellow on the outer petals; centre deep yellow. In flower April 20 to May 15.

13. *Claremont Silver* (Hogg & Robertson).—Height 9 inches; flowers bright rose pink shading to carmine with age, and occasionally feathered with white; centre yellow shading to cream-white. In flower April 20 to May 14.

14. *Claremont White* (Hogg & Robertson).—Height 8 inches; flowers white tinged with cream, which gradually disappears with age; yellow centre. Inferior to No. 17. In flower April 21 to May 14.

15. *Cottage Maid* (*syn.* *La Précieuse*),  $\times \times \times$  May 2, 1900 (J. Veitch, Jones).—Height 6 inches; sturdy habit; medium-sized, well-shaped flowers with pointed petals, lovely rose pink shading to cream-white; yellow centre. In flower April 23 to May 12.

16. *Couleur Ponceau* (Hogg & Robertson, Jones).—Height 1 foot; flowers of good shape and substance, rosy crimson shading to blush white near the yellow centre; the central portion of the three outer petals is blush white shading to delicate rose-pink. In flower May 2 to May 19.

17. *Cramoise Pourpre* (Hogg & Robertson).—Height 8 inches; flowers borne on stout stems, bright rose shading to pink towards the yellow centre. In flower May 1 to May 18.

18. *David Temer*,  $\times \times \times$  May 2, 1900 (Hogg & Robertson).—Height 8 inches; sturdy habit; flowers with substantial petals of excellent form and substance borne on strong stems, pure white with a dull yellow centre. An improvement on No. 36. In flower April 23 to May 16.

19. *Duc de Malakoff* (Hogg & Robertson).—Similar to but not so good as No. 27.

20. *Duchesse de Parma*,  $\times \times \times$  May 2, 1900 (Hogg & Robertson, J. Veitch, Jones).—Height 1 foot; vigorous habit; flowers large and handsome, orange-red with a bold, irregular margin of deep yellow and suffused with rose on the outer petals; yellow centre. In flower May 1 to May 14.

21. *Dussart*,  $\times \times \times$  May 2, 1900 (J. Veitch, Jones).—Height 6 inches; sturdy habit; flowers with long petals of good outline, crimson-scarlet with a greenish-yellow centre and touched with rosy-purple on the outer petals. Grand for massing. In flower May 1 to May 12.

22. *Epaminondas*,  $\times \times \times$  April 26, 1900 (Hogg & Robertson).—Height 6 inches; large cup-shaped rose-scarlet flowers suffused with carmine and purple on the outer petals; yellow centre. In flower April 23 to May 19.

23. *Epaminondas Feathered* (Hogg & Robertson).—This differs from

No. 22 by reason of the flowers being feathered with white on both sides of the petals.

24. *Globe de Rigaut* (Hogg & Robertson).—Height 8 inches; flowers violet, feathered and marked with white; cream-white centre. In flower May 1 to May 15.

25. *Grace Darling* (Jones).—Height 10 inches; flowers large, dull, orange-scarlet with a dark centre. In flower April 26 to May 10.

26. *Grand Duc de Russie* (*syn.* *Jaght Van Rotterdam*),  $\times \times \times$  May 15, 1900 (Hogg & Robertson).—Height 7 inches; sturdy habit; flowers large, borne on stiff stems, rose, flushed with violet and striped with white; yellow centre. In flower April 26 to May 12.

27. *Hector*,  $\times \times \times$  May 2, 1900 (Hogg & Robertson).—Height 8 inches; vigorous habit; flowers very large and substantial, orange-red beautifully edged with lemon-yellow. An improvement on Nos. 19 and 20. In flower May 1 to May 22.

28. *Herman Schlegel* (Jones).—Height 10 inches; flowers of medium size and excellent shape, canary-yellow stained with primrose on the outer petals. In flower May 2 to May 16.

29. *Jaght Van Delft* (Hogg & Robertson).—Height 6 inches; flowers rather small and of good form, pure white with a yellow centre. Suitable for margins. In flower April 23 to May 17.

30. *Jan Luiken* (Hogg & Robertson).—Height 6 inches; broad, cup-shaped, rosy-crimson flowers tipped and suffused with white and stained with pink on the outer petals; yellow centre. In flower April 23 to May 7.

31. *Joost Van Vondel*,  $\times \times \times$  May 2, 1900 (J. Veitch, Jones).—Height 8 inches; sturdy habit; flowers very large, cup-shaped, rosy-red, more or less flaked with white and suffused with delicate rose on the central portion of the outer petals; light centre. In flower April 28 to May 22.

32. *Joost Van Vondel White*,  $\times \times \times$  May 2, 1900 (Hogg & Robertson).—A splendid pure white-flowered form of No. 31.

33. *Keizerskroon*,  $\times \times \times$  April 26, 1900 (J. Veitch, Jones).—Height 11 inches; vigorous habit; flowers very large, borne on stout stems; colour yellow and red. Very showy when seen in masses. In flower April 23 to May 10.

34. *Koh-i-noor* (Hogg & Robertson).—Height 8 inches; flowers of medium size with stout pointed petals, maroon with a conspicuous yellow centre. In flower May 1 to May 16.

35. *La Belle Alliance* (*syn.* *Waterloo*),  $\times \times \times$  May 2, 1900 (Jones).—Height 7 inches; sturdy habit; flowers of good form and substance, crimson-scarlet with a yellow centre and suffused with rosy-purple on the outer petals. In flower April 23 to May 18.

36. *La Latière* (Hogg & Robertson).—Height 6 inches; flowers white with a yellow centre and touched with cream on the exterior of petals. Inferior to No. 18. In flower April 23 to May 22.

37. *La Matelas*,  $\times \times \times$  April 26, 1900 (Hogg & Robertson, Jones).—Height 1 foot; sturdy habit; flowers of excellent shape and very substantial, silvery pink, tipped with white and shaded with blush white on the central portion of the outer petals; yellow centre. Very effective. In flower April 20 to May 16.

38. *La Reine* (*syn.* *Queen Victoria*),  $\times \times \times$  May 2, 1900 (Jones).—Height 8 inches; robust habit; flowers of excellent shape and substance, white suffused with delicate pink and stained with cream-white on the outer petals. In flower April 23 to May 11.

39. *Lord Derby* (Jones).—Height 7 inches; sturdy habit; flowers large and handsome, cream-white changing to pure white. In flower April 20 to May 11.

40. *Maes*,  $\times \times \times$  April 26, 1900 (Hogg & Robertson).—Height 8 inches; sturdy habit; flowers large, with broad, well-shaped petals, rich scarlet tinged with purple on the exterior. The centre is bronze colour surrounded with a bright yellow circle which gives additional beauty. This is undoubtedly the very best early single-flowered scarlet Tulip for bedding.

41. *Mon Trésor*,  $\times \times \times$  April 26, 1900 (Hogg & Robertson).—Height 10 inches; vigorous habit; large handsome flowers with round petals of excellent substance; colour intense golden yellow. In flower April 23 to May 14.

42. *Moucheron* (Hogg & Robertson).—Height 11 inches; vigorous habit; flowers large borne on stout stems, rich scarlet with a yellow centre. In flower May 1 to May 23.

43. *Ophir d'Or*,  $\times \times \times$  April 26, 1900 (Hogg & Robertson, Jones).—Height 9 inches; very sturdy habit; flowers extra large, of excellent form with broad canary yellow petals borne on stiff stems, each of which carries two and sometimes three fully developed sweet-scented flowers. In flower April 26 to May 21. This is one of the very best yellow single-flowered Tulips for bedding.

44. *Paul Moreelse* (Hogg & Robertson). Height 8 inches; large cup-shaped flowers, purplish rose with a yellow centre. In flower May 1 to May 21.

45. *Pink Beauty*,  $\times \times \times$  May 2, 1900; **A.M.** May 8, 1900 (Jones).—Height 10 inches; sturdy habit; large beautifully formed flowers with broad, substantial petals, bright rose-pink shading to blush-white near the yellowish centre. The central portion of the outer petals is heavily marked with blush-white or flesh pink. In flower May 1 to May 19.

46. *Pottebakker Scarlet* (Hogg & Robertson, Jones).—Height 10 inches; flowers large and handsome, borne on stout stems, rich scarlet with a yellow centre. In flower May 1 to May 18.

47. *Pottebakker White*,  $\times \times \times$  April 26, 1900 (Hogg & Robertson, Jones).—Height 1 foot; vigorous habit; large cup-shaped white flowers with a yellow centre borne on very stout stems. This is the best early white Tulip. In flower April 19 to May 5.

48. *Pottebakker Yellow* (Hogg & Robertson).—A yellow-flowered form of No. 47. In flower April 26 to May 9.

49. *Prince de Ligny* (Hogg & Robertson).—Similar to No. 41, but the flowers are small and not quite so good.

50. *Prince of Austria* (Hogg & Robertson, Jones).—Height 11 inches; flowers with long pointed petals borne on stout stems, scarlet suffused with orange; yellow centre. Sweet-scented. In flower May 1 to May 23.

51. *Princess Ida* (Jones).—Height 7 inches; flowers white with pointed

petals striped down the centre and slightly feathered with canary yellow ; yellow centre. In flower April 23 to May 11.

52. Princess Marianne (Jones).—Height 10 inches ; flowers very large, cream-white suffused and striped with pink shading to rose with age. In flower April 23 to May 12.

53. Proserpine,  $\times \times \times$  April 26, 1900 (Hogg & Robertson, J. Veitch, Jones).—Height 9 inches ; sturdy habit ; flowers very large and handsome, bright rose suffused with purple on the outer petals. Very attractive. In flower April 26 to May 17.

54. Queen of the Netherlands,  $\times \times \times$  May 5, 1900 ; A.M. May 9, 1900 (Jones).—Height 8 inches ; sturdy habit ; flowers very large and of fine form, bluish-white or delicate pink with a yellow centre. In flower April 26 to May 16.

55. Rachel Ruysch (Hogg & Robertson).—Height 6 inches ; flowers very delicate rose pink shading to cream-white near the pale yellow centre ; exterior of petals stained with rose. In flower April 23 to May 14.

56. Rosa Mundi,  $\times \times \times$  May 9, 1900 (Hogg & Robertson).—Height 8 inches ; sturdy habit ; flowers rather small, of excellent form, bluish-white tipped with rose and suffused with rose-pink on the outer petals ; yellow centre. In flower May 1 to May 23.

57. Rose Gris de Lin (Jones).—Height 7 inches ; sturdy habit ; flowers of excellent shape, rose flushed with pink ; yellow centre. In flower May 2 to May 18.

58. Rose Luisante (Hogg & Robertson, Jones).—Height 10 inches ; sturdy habit ; flowers rather small, lovely rose shading to pink, with a yellow centre ; exterior of petals suffused with blush-white. In flower May 2 to May 21.

59. Royal Standard (Jones).—See No. 60.

60. Silver Standard (*syn.* Royal Standard) (Jones).—Height 9 inches ; flowers with pointed petals, white ground flaked and tipped with scarlet ; yellow centre ; very showy. In flower May 2 to May 19.

61. Snowflake (Hogg & Robertson).—Height 1 foot ; sturdy habit ; flowers of excellent shape with long, rather broad, sharply pointed snow-white petals which reflex with age ; yellow centre. In flower May 1 to May 21. Received as White Swan.

62. Thomas Moore,  $\times \times \times$  May 2, 1900 (Hogg & Robertson).—Height 14 inches ; handsome cup-shaped sweet-scented flowers with stout petals borne on slender stems, bright orange shaded with scarlet, which is very effective seen in masses in full sunlight. In flower May 1 to May 21.

63. Van der Neer,  $\times \times \times$  April 26, 1900 (Jones).—Height 9 inches ; sturdy habit ; flowers large violet purple with broad petals and a yellowish centre. The three outer petals reflex considerably. In flower April 23 to May 5. Received as Wouvermann.

64. Vermilion Brilliant,  $\times \times \times$  April 26, 1900 (Hogg & Robertson, Jones).—Height 6 inches ; flowers with rather pointed petals of medium size and excellent shape ; rich, dazzling scarlet with a yellow centre. Grand for margins. In flower April 21 to May 12.

65. Wapen van Leiden (Arms of Leiden) (Hogg & Robertson).—Height 1 foot ; sturdy habit ; very free-flowering ; flowers very large,

borne on stout stems, white suffused with rose in the middle of petals. In flower May 1 to May 15.

66. White Swan (Jones).—Similar to No. 61, but the egg-shaped flowers are a trifle smaller, and the petals longer and narrower.

67. Yellow Prince (*syn.* Golden Prince) (Hogg & Robertson, Jones).—Height 6 inches; sweet-scented flowers of good form and substance, rich yellow marked with orange towards the base of the petals. Well adapted for margins. In flower May 1 to May 22.

## II.—LATE SINGLE FLOWERING TULIPS.

68. Comte de Vergennes (Hogg & Robertson).—Height 7 inches; flowers variable in colour, but mostly white, feathered with rosy scarlet. In flower May 5 to May 19.

69. Coquette de Belleville (Barr).—Height 1 foot; medium-sized flowers, borne on stout stems, rose, flaked and margined with white. In flower May 11 to May 23.

70. Couleur de Cardinal,  $\times \times \times$  May 9, 1900 (J. Veitch, Hogg & Robinson, Jones).—Height 9 inches; sturdy habit; beautifully formed, medium-sized flowers with thick pointed petals, borne on stout stems, intense crimson shaded with plum on the exterior; yellow centre. In flower May 5 to May 19.

71. Daunt Maid (Barr).—Height 18 inches; flowers borne on stout stems, of excellent form; white ground, heavily marked and stained with purplish lilac; pale blue centre. In flower May 23 to June 9.

72. Dame Élégante (Krelage).—Height 14 inches; flowers borne on rather slender stems, cream white, freely striped and veined with carmine. In flower May 12 to May 21.

73. Fairy Queen (Hogg & Robertson, Barr).—Height 18 inches; flowers with rather pointed petals of excellent substance, rosy heliotrope shading to yellow. The central portion of the outer petals is stained with bright heliotrope. In flower May 17 to June 4.

74. Firefly (Barr).—Height 14 inches; flowers of good form, with pointed petals, bright orange red, with a green and old gold centre sweet-scented. In flower May 23 to June 4.

75. Isabella,  $\times \times \times$  May 24, 1900 (Hogg & Robertson, J. Veitch, Barr). Height 10 inches; sturdy habit; beautifully formed flowers, with long, pointed petals, carmine and rose shaded with cream-white, and suffused with silvery white and rose on the exterior of petals; centre light blue on a white ground. In flower May 11 to June 4. This variety was found in County Mayo nearly a century ago, and the sorts bearing the names Shandon Bells, Blushing Bride, York and Lancaster, and Silver Queen are merely selections from it, are not fixed, and revert to the type. There is, however, a Dutch Tulip sold as York and Lancaster which is quite distinct from Isabella, and which is one of the first of the May-flowering section to bloom.

76. Lac van Rhyn (Hogg & Robertson).—Height 11 inches; flowers of exquisite form and substance, rosy lilac edged with white and shaded with violet on the outer petals; yellow centre. In flower May 9 to May 23.

77. Leonardo da Vinci (J. Veitch).—Height 7 inches; sturdy habit; free-flowering; flowers orange scarlet tipped with orange; yellow centre. In flower May 10 to May 22.

78. Parisian Yellow (Hogg & Robertson, Barr).—Height 16 inches; vigorous habit; flowers with long, stout pointed petals borne on stiff stems, rich lemon yellow with a deeper centre. In flower May 19 to June 7.

79. Rosalind (Hogg & Robertson, Jones, Barr).—Height 16 inches; flowers with pointed petals; bright rose self with a white centre; sweet-scented. In flower May 21 to June 9. Received as *Gesneriana alba oculata*.

80. Rose Pompon (Hogg & Robertson).—Height 14 inches; sturdy habit; flowers semi-double, borne on stiff stems, pale yellow flaked with rose pink. In flower May 18 to June 2.

81. Royal White,  $\times \times \times$  May 16, 1900 (Barr).—Height 7 inches; sturdy habit; beautifully shaped *Nymphaea*-like flowers with stout pointed petals, pure white with a yellow centre. A valuable late-flowering white Tulip. In flower May 11 to June 6.

82. Shandon Bells (Hogg & Robertson).—See No. 75.

83. Stella,  $\times \times \times$  May 24, 1900 (Barr).—Height 18 inches; flowers of excellent form and substance, deep carmine shading to pink, the basal portion of the petals marked with deep blue on a white ground. In flower May 23 to June 7.

84. Striped Beauty, (Barr).—See No. 85.

85. Summer Beauty (*syn.* Striped Beauty),  $\times \times \times$  May 16, 1900 (J. Veitch, Barr).—Height 1 foot; sturdy habit; flowers large and of good form, purplish heliotrope flaked with cerise and cream-white; light blue centre; very effective. In flower May 1 to June 1. This is quite distinct from *Zommerchoon* of the Dutch growers.

86. York and Lancaster (Barr).—See No. 75.

#### DOUBLE TULIPS.

87. Belle Alliance (Hogg & Robertson).—Height 16 inches; flowers large, borne on stout stems, bluish violet and purple, freely streaked with white. In flower May 21 to June 8.

88. Bleu Céleste (*syn.* Lord Palmerston, Blue Flag) (Hogg & Robertson).—Height 16 inches; large, substantial, bluish-violet flowers. In flower May 19 to June 5.

89. Couronne d'Or (*syn.* Soleil d'Or) (Hogg & Robertson).—Height 8 inches; sturdy habit; flowers large, borne on stout stems, deep yellow, marked with orange red. In flower April 26 to May 21.

90. El Toreador,  $\times \times \times$  May 2, 1900; **A.M.** May 9, 1900 (Jones).—Height 11 inches; sturdy habit; flowers very large, of good form and substance, reddish brown and orange, with a yellow base. Very handsome. In flower May 1 to May 19. It is sometimes called Brown Tournesal.

91. Gloria Solis (Jones).—Height 10 inches; flowers rich yellow, running to deep red. Very showy. In flower April 23 to May 17.

92. Imperator Rubrorum,  $\times \times \times$  May 2, 1900 (Hogg & Robertson, Jones).—Height 8 inches; sturdy habit; flowers large, the petals rather

loosely arranged, bright scarlet with a yellow centre. Superior to No. 102. In flower May 1 to May 22.

93. *La Candeur* (Hogg & Robertson, Jones).—Height 7 inches; sturdy habit; flowers borne on stout stems, white touched with cream-white which gradually disappears as the flowers reach full size. Exterior of petals suffused with green. In flower May 4 to June 1.

94. *La Grandesse* (Jones).—Height 12 inches; sturdy habit; flowers large, soft rose shaded with white. In flower May 1 to May 15.

95. *Le Blason* (Hogg & Robertson).—Height 7 inches; flowers rather coarse, rose pink shading to white. Deeper in colour than No. 98. In flower May 8 to May 23.

96. *Lord Beaconsfield* (Jones).—Height 1 foot; flowers very large, of good form and substance, rose with paler shadings. In flower May 1 to May 26.

97. *Mariage de ma Fille* (Hogg & Robertson).—Height 18 inches; flowers extra-large and of excellent form, white feathered with rosy crimson. In flower May 19 to June 5.

98. *Murillo* (*syn.* *Albano*) (Hogg & Robertson, Jones). Height 6 inches; sturdy habit; flowers large delicate blush pink. Paler than No. 95. In flower May 1 to May 19.

99. *Parmesiana* (Jones).—Height 6 inches; flowers of medium size and good form, rose shading to pale pink. In flower May 4 to May 18.

100. *Prince of Wales* (Hogg & Robertson).—Height 7 inches; flowers large and handsome, crimson, touched with cerise. In flower April 27 to May 19.

101. *Queen of Whites* (Jones).—Height 8 inches; sturdy habit; large cup-shaped flowers, white, with a yellow centre. In flower May 2 to May 16.

102. *Rex Rubrorum* (J. Veitch, Jones).—Height 11 inches; flowers bright scarlet. Not so good as No. 92. In flower May 1 to May 18.

103. *Rose Blanche*,  $\times \times \times$  May 16, 1900 (Hogg & Robertson, Jones).—Height 9 inches; sturdy habit; flowers large, with incurving snow-white petals of great substance. This is the best double white Tulip for bedding. In flower May 9 to June 1.

104. *Tournesal*,  $\times \times \times$  May 2, 1900 (Hogg & Robertson, Jones).—Height 10 inches; sturdy habit; flowers rich scarlet, irregularly edged, with yellow, very showy and fragrant. In flower May 1 to May 20.

105. *Tournesal yellow* (Hogg & Robertson).—Height 10 inches; sturdy habit; flowers large, rather flat when fully expanded, bright yellow, with a faint suspicion of orange. Some of the petals are occasionally marked and tipped with reddish orange. In flower May 1 to May 20.

106. *Voltaire*,  $\times \times \times$  May 9, 1900 (Hogg & Robertson).—Height 10 inches; sturdy habit; flowers of excellent form, borne on very stout stems, intense crimson shading to maroon. This is one of the very finest double crimson bedding Tulips. In flower May 5 to May 24.

107. *Vuurbaak*,  $\times \times \times$  May 9, 1900 (Hogg & Robertson, Jones).—Height 9 inches; sturdy habit; flowers a trifle brighter in colour than No. 92; rich scarlet, with a slight suspicion of orange when fully expanded. In flower May 2 to May 22.

108. *William III.*,  $\times \times \times$  May 2, 1900 (Hogg & Robertson).—Height

10 inches; flowers large and of good shape, rich orange scarlet. One of the best double scarlet Tulips extant. In flower May 2 to May 21.

109. Yellow Rose (*syn.* Gele Roos) (Jones).—Height 10 inches; flowers large, rich yellow, and very fragrant. The flowers are very heavy and borne on rather slender stems; consequently rough winds blow them about, and in very wet weather rain greatly disfigures them. In flower May 21 to June 1.

#### SPECIES, &c.

110. *Acuminata* (*syn.* *T. cornuta* and *T. c. chinensis*) (Barr, Hogg & Robertson, J. Veitch).—Height 18 inches; flowers with long narrow thread-like petals borne on slender stems; colour bright scarlet and yellow. In flower May 11 to May 28.

111. *Aurantiaca* (Hogg & Robertson).—This is a selection from No. 137. Height 16 inches; flowers of excellent shape, with long bright orange-red petals tipped with orange yellow; dark centre; very fragrant. In flower May 21 to June 2.

112. *Australis* (*syn.* *T. celsiana*) (Barr).—Height 1 foot; sweet-scented flowers, borne on rather slender stems, bright yellow touched with green on the exterior of the petals. In flower April 23 to May 23.

113. *Billietiana*, × × × May 24, 1900 (Barr, J. Veitch). Height 18 inches; sturdy habit; flowers large, with long pointed petals, rich buttercup yellow, margined and slightly shaded with orange scarlet. Very showy and grand for cutting. In flower May 19 to June 6.

114. *Billietiana nana* (Barr).—A dwarf free-flowering form of No. 113.

115. *Billietiana Sunset*, × × × May 24, 1900 (Hogg & Robertson, Barr).—Height 1 foot; flowers with rather long-pointed petals, lovely orange yellow, edged and flaked with orange scarlet; dark centre. In flower May 21 to June 2.

116. *Bouton d'Or*, × × × May 16, 1900 (*syn.* *Ida, Golden Beauty*) (Hogg & Robertson, Krelage, J. Veitch).—Height 18 inches; sturdy habit; flowers of large size, with stout petals of good form, rich orange yellow. Grand for cutting. In flower May 11 to June 5.

117. *Buenaventura* (Hogg & Robertson, Barr).—Height one foot; flowers of good shape with pointed petals, bright orange scarlet, striped and flaked with golden yellow, and suffused with carmine on the outer petals; yellow centre. In flower May 11 to May 29.

118. *Carinata rubra* (Hogg & Robertson, Barr).—Height 16 inches; flowers dull crimson, lower portion of petals green and yellow. In flower May 25 to June 1.

119. *Columbus* (*syn.* *Gala Beauty*), × × × May 24, 1900 (Hogg & Robertson, Krelage, J. Veitch, Barr).—Height 16 inches; sturdy habit; very free-flowering; flowers with long sharply pointed petals, rich crimson, heavily striped and deeply edged with rich buttercup yellow. Very effective. In flower May 19 to June 9.

120. *Cornuta* (J. Veitch).—See No. 110.

121. *Cornuta chinensis* (Hogg & Robertson).—See No. 110.

122. *Didieri* (*syn.* *T. Fransoniana*) (Hogg & Robertson).—Height 17 inches; flowers of medium size, borne on slender stems, crimson with a dark centre surrounded with a primrose yellow band. In flower May 11 to May 24.

123. *Didieri alba* (Barr).—Height 14 inches ; flowers rose-bud shape, cream-white passing to pure white ; sweet-scented. In flower May 21 to June 5.

124. *Elegans* (J. Veitch, Barr, Jones).—Height 14 inches ; flowers with pointed petals, scarlet, with a yellow centre. In flower May 1 to May 22.

125. *Elegans alba*, A.M. May 14, 1895 (Jones).—Height 20 inches ; flowers of excellent shape, white, with a rose Picotee edge. In flower May 10 to June 2.

126. *Elegans variegata* (Barr).—Height 14 inches ; flowers with rather twisted petals, crimson striped with rich yellow ; very showy. In flower May 11 to May 23.

127. *Fulgens*,  $\times \times \times$  May 24, 1900 (Barr, Jones, Hogg & Robertson).—Height 2 feet ; flowers large, with broad substantial petals borne on stout stems ; rosy crimson with a white centre. This creates a glorious effect on a sunny day. In flower May 11 to May 30.

128. *Gala Beauty* (J. Veitch).—See No. 119.

129. *Gala Beauty* (Barr).—See No. 119.

130. *Gesneriana Bridesmaid* (Hogg & Robertson).—Height 14 inches ; sturdy habit ; very free-flowering ; flowers large with pointed petals, bright rose heavily streaked with white ; blue centre. In flower May 19 to June 2.

131. *Gesneriana rosea* (Hogg & Robertson, Barr).—Height 16 inches ; very free-flowering ; flowers of good shape and substance, with long pointed petals, rich rose with a deep indigo blue base. In flower May 19 to June 5.

132. *Gesneriana rosea cerulea* (Hogg & Robertson).—See No. 131.

133. *Gesneriana spathulata* (*syn.* T. G. Major),  $\times \times \times$  May 24, 1900 (Barr).—Height 22 inches ; flowers with pointed petals, rich scarlet tinged with crimson and flushed with rosy crimson on the exterior of petals ; deep indigo blue base. Grand for massing. In flower May 19 to June 1.

134. *Golden Beauty* (Barr).—See No. 116.

135. *Golden Crown*,  $\times \times \times$  May 16, 1900 (J. Veitch, Barr, Hogg & Robertson, Krelage, Jones).—Height 16 inches ; sturdy habit ; beautifully shaped flowers with broad substantial petals tapering to a fine point, rich golden yellow edged with orange, and in some cases flaked with scarlet. In flower May 2 to May 29.

136. *Golden Eagle* (Krelage).—Height 1 foot ; flowers of medium size borne on slender stems, rich canary-yellow self and slightly fragrant. In flower May 5 to May 21.

137. *Goldflake*,  $\times \times \times$  May 24, 1900 (Hogg & Robertson).—Height 18 inches ; sturdy habit ; flowers large, of excellent form and substance, orange-scarlet flaked with old gold ; yellow centre ; very showy and sweet-scented. In flower May 21 to June 2.

138. *Haageri* (Barr).—Height 11 inches ; delicate grower ; flowers rather small, red, with a faint suspicion of yellow on the exterior of petals ; dark centre. In flower May 10 to May 21.

139. *Macrospeila*,  $\times \times \times$  May 24, 1900 (Hogg & Robertson, Barr, J. Veitch).—Height 14 inches ; very free-flowering ; flowers with rather

pointed petals, bright scarlet with a dark centre surrounded by a clear yellow zone; sweet-scented. In flower May 21 to June 5.

140. *Maculata Major*,  $\times \times \times$  May 24, 1900 (Barr, Hogg & Robertson).—Height 20 inches; flowers large, borne on rather slender stems, rich crimson with a dark centre and a golden yellow zone. In flower May 19 to June 21.

141. *Maculata Brilliant* (Barr).—A dwarf late flowering form of No. 140.

142. *Maiden's Blush* (J. Veitch).—See No. 146.

143. *Narbonensis alba* (Hogg & Robertson).—See No. 149.

144. *Orphanidea* (Barr).—Failed to flower.

145. *Persica*.  $\times \times \times$  May 24, 1900 (Barr).—Height 4 inches; leaves undulated, scarcely rising above the ground; exceptionally free-flowering; flowers small, borne on stiff stems, lovely buttercup yellow, some stems carrying four and five fully developed very fragrant flowers. It is a gem for a sunny spot on the rockery. In flower May 16 to June 11.

146. *Picotée* (*syn.* *Maiden's Blush* and *elegans Picotée*),  $\times \times \times$  May 16, 1900 (Barr, Hogg & Robertson, Jones).—Height 20 inches: lovely long flowers, at first cream-white, gradually passing to pure white, with a distinct margin of rose pink to the gracefully recurving petals. Grand for cutting. In flower May 16 to June 8.

147. *Platystigma* (Barr).—Height 14 inches; flowers delicate rose suffused with orange towards the margins of the long narrow petals; greenish-yellow centre. In flower May 18 to May 29. This is supposed to be the parent of the Parrot Tulips.

148. *Retroflexa* (Barr).—Height 16 inches; lovely yellow flowers with long recurving petals. In flower May 11 to May 26.

149. *Sweet Nancy* (*syn.* *Narbonensis alba*) (Barr, Hogg & Robertson).—Height 16 inches; beautifully shaped flowers with long pointed petals, white, delicately edged with pink and occasionally flaked with rose pink. In flower May 17 to June 8.

150. *Sylvestris* (*syn.* *Florentina*).—(Hogg, Robertson, J. Veitch, Jones).—Height 16 inches; sweet-scented lovely buttercup-yellow flowers, with long pointed petals borne on slender stems. In flower April 23 to May 8. Foliage badly diseased, and many bulbs failed to flower.

151. *Sylvestris major* (Barr).—A vigorous-growing form of No. 150. Foliage badly diseased.

152. *Undulatifolia* (Barr).—Height 7 inches; flowers with pointed petals, bright red with a dark centre, surrounded with a clear yellow circle. In flower May 1 to May 18.

153. *Virginalis* (Hogg & Robertson).—Height 16 inches; sturdy habit; very free-flowering, some bulbs produce 3 and 4 spikes, each of which bears two and three flowers apiece. The flowers with rather pointed petals are white flaked and margined with rosy crimson. In flower May 11 to June 7. This is sometimes called *Picotée*, but it is not nearly so beautiful as the true *Picotée*.

154. *Viridiflora* (Barr, Hogg & Robertson).—Height 14 inches; flowers green with a broad margin of dull yellow. In flower May 19 to June 4.

155. *Viridiflora præcox* (Barr).—A paler and earlier-flowered form of No. 154.

156. *Vitellina* (Hogg & Robertson).—Height 22 inches; vigorous habit; flowers of excellent shape, lovely pale yellow shaded with straw yellow, and conspicuous for its bright yellow anthers. Very fine. In flower May 14 to June 1.

#### VARIEGATED-LEAVED TULIPS.

157. *Feu de l'Empire* (J. Veitch).—Height 5 inches; leaves pale green margined with yellow; flowers crimson feathered with yellow; deep yellow base. In flower May 1 to May 17.

158. *La Panaché* (*syn.* *La Ravisante*) (Barr).—Height 10 inches; leaves light green with a broad margin of deep yellow; flowers rather small, creamy white, heavily marked with rosy crimson. In flower May 17 to May 31.

159. *Thorbecke* (Hogg & Robertson).—Height 6 inches; leaves glaucous margined with cream; flowers small cream-white with a yellow centre. In flower April 23 to May 19.

160. *Variegated leaved Yellow Prince* (J. Veitch).—This differs from No. 67 in having variegated leaves, and the flowers are tipped with green. In flower May 1 to May 23.

#### DARWIN TULIPS.

These are quite distinct from the early flowering kinds by reason of their taller growth, form of flower, and time of blossoming, for which reason they are valuable for keeping up a succession of flowers. For naturalising in the grass, planting in bold groups in the park and shrubbery, they are admirably adapted; but as the flowers are carried on long stems they should be protected from rough winds.

161. *Alphonse Daudet* (Hogg & Robertson).—Height 2 feet; flowers large with broad round petals, deep red shading to rosy purple, with a conspicuous blue centre. In flower May 15 to June 1.

162. *Anthony de Bary* (Hogg & Robertson).—Height 2 feet; flowers of medium size and good shape, deep purple with a dark blue centre. In flower May 23 to June 2.

163. *Auber*,  $\times \times \times$  May 16, 1900 (Hogg & Robertson).—Height 22 inches; large cup-shaped flowers of exquisite form, violet purple, suffused with mauve and heliotrope with age. Light inky-blue centre. In flower May 14 to June 1.

164. *Beyrick* (Hogg & Robertson).—Height 26 inches; flowers large and of excellent form with stout rosy lilac petals shading to paler lilac towards the tips; centre very pale blue. In flower May 22 to June 1.

165. *Cabanel* (Krelage).—Height 2 feet; flowers of medium size, rose, with paler shadings, the inner petals striped with white; light centre. In flower May 14 to June 1.

166. *Calypso*,  $\times \times \times$  May 21, 1900 (Hogg & Robertson).—Height 2 feet; very free-flowering; flowers unusually large, borne on very stout stems; colour salmon red, suffused with rose on the outer petals; white centre with a narrow zone of pale blue. In flower May 14 to June 2.

167. *Claude Gillot* (Krelage).—Height 2 feet; fairly well formed,

bright scarlet flowers with a black base and white zone. The exterior of the petals are stained with bright rose. In flower May 14 to May 30.

168. Deschamps (Hogg & Robertson).—Height 2 feet; beautifully shaped flowers with broad petals, deep reddish purple, with a deep blue base. In flower May 16 to May 29.

169. Dr. Wagner (Hogg & Robertson).—Height 22 inches; flowers rather small, red shading to scarlet, the inner petals striped with bright rose down the centre, and flushed with purple on the exterior; blue base. In flower May 16 to June 4.

170. Donders,  $\times \times \times$  May 16, 1900 (Hogg & Robertson).—Height 2 feet; very free-flowering; flowers large with stout petals, crimson flushed with maroon; inky-blue base with a white zone. Very effective on a sunny day.

171. Duc de Richihen (Krelage).—Height 2 feet; flowers borne on stout stems; colour scarlet faintly suffused with purple and stained with a deeper shade on the outer petals; deep blue base. In flower May 11 to June 1.

172. Duchesse de Mouchy (Krelage).—Height 2 feet; beautifully formed flowers, with broad, substantial petals; colour rose pink, edged with blush-white and striped with white down the centre of the inner petals; white base. In flower May 15 to May 30.

173. Edouard André (Krelage).—Height 20 inches; flowers large purplish lilac with blush shadings. The base of the flower is white and pale blue. In flower May 14 to May 28.

174. Emily (Krelage).—Height 2 feet; large well-formed flowers; colour scarlet, suffused with purple on the exterior of the petals; inky blue base. In flower May 11 to May 30.

175. Emmanuel Sweerts (Hogg & Robertson).—Height 2 feet; flowers of excellent shape and substance borne on stout stems; colour bright rosy lilac with paler shadings; white and pale blue base. In flower May 24 to June 6.

176. Europe,  $\times \times \times$  May 16, 1900 (Krelage).—Height 22 inches; flowers of excellent shape borne on stiff stems; colour rosy scarlet, the inner petals striped with rose down the centre and the outer ones flushed with purple; white base. In flower May 16 to May 31.

177. Fraulein Amberg,  $\times \times \times$  May 16, 1900 (votes, 4 for, 3 against) (Hogg & Robertson).—Height 2 feet; flowers large deep violet shading to heliotrope; light base. In flower May 14 to June 1.

178. G. de Cardous (Krelage).—Height 2 feet; medium-sized, well-formed flowers; colour rich scarlet; exterior of petals flushed with carmine; deep blue base. In flower May 12 to May 29.

179. General Kohler (Krelage).—Height 26 inches; flowers rosy crimson with broad substantial petals touched with purple on the exterior; blue base. In flower May 14 to May 29.

180. Glory (Krelage).—Height 2 feet; flowers large and of good form, rich scarlet, almost vermilion, with a prominent white band down the centre of the inner petals, the outer ones being touched with carmine; blue base. In flower May 12 to May 31.

181. Gluck (Hogg & Robertson).—Height 20 inches; flowers small reddish purple with a white base. In flower May 14 to May 29.

182. *Gustave Doré*,  $\times \times \times$  May 16, 1900 (Krelage).—Height 2 feet; excellently shaped flowers with very broad, substantial petals; colour bright rose shading to pink and striped with white down the centre of the inner petals; white base. In flower May 12 to May 31.

183. *Henner* (Hogg & Robertson).—Height 22 inches; flowers of good shape borne on stout stems; colour bright scarlet with an inky blue base and white zone. In flower May 15 to June 2.

184. *James McIntosh* (Hogg & Robertson).—Height 20 inches; mauve-coloured flowers shading to salmon with a band of white down each of the inner petals; yellowish base with an indistinct bluish zone. In flower May 16 to June 1.

185. *Jalosa* (Krelage).—Height 20 inches; flowers of good form with broad petals; colour mauve or heliotrope passing to a paler shade; blue base. In flower May 14 to May 31.

186. *Joos* (Hogg & Robertson).—Height 2 feet; flowers large deep rosy lilac with paler shadings; white base with a narrow zone of white. In flower May 15 to May 29.

187. *Joseph Israels* (Krelage).—See No. 222.

188. *Julia* (Hogg & Robertson).—Height 2 feet; flowers of excellent form; rose shading to pink; inky-blue base. In flower May 16 to June 1.

189. *Kate Greenaway* (Krelage).—Height 20 inches; well-formed flowers with stout petals; colour pale rose passing to blush white, with a faint suspicion of blue in the centre of the flower. In flower May 22 to June 1.

190. *Kern* (Hogg & Robertson). Height 2 feet; flowers of excellent form, with broad substantial petals; pale purple shading to pinkish heliotrope with a yellow base. In flower May 22 to June 1.

191. *Landelle*,  $\times \times \times$  May 24, 1900 (Hogg & Robertson). This is very similar to No. 182.

192. *Laurentia* (Hogg & Robertson).—Height 2 feet; flowers of good shape with broad petals; bright scarlet flushed with purple on the exterior; blue base. In flower May 16 to June 4.

193. *Louis Memmerel* (Hogg & Robertson).—Height 20 inches; flowers borne on sturdy stems, salmon pink shading to rose; deep blue base. In flower May 16 to June 24.

194. *Madame A. Griguer* (Krelage).—Height 22 inches; medium-sized flowers of good form, carmine rose touched with purple, the three inner petals striped with white down the centre. In flower May 16 to May 28.

195. *Madame Bosboom Toussaint*,  $\times \times \times$  May 24, 1900 (Hogg & Robertson).—Height 22 inches; flowers with broad well-rounded petals; colour rosy purple, paler towards the tips, and marked with rose pink on the exterior; indigo-blue base. In flower May 28 to June 1.

196. *Marie Edgeworth* (Hogg & Robertson).—Height 22 inches; flowers rich rose shading to lilac, basal portion of petals marked with blue on a white ground. In flower May 28 to June 5.

197. *Maugerin* (Hogg & Robertson).—Height 2 feet; flowers rather rough deep rosy purple; blue base. In flower May 14 to May 28.

198. *Medusa* (Hogg & Robertson).—Height 2 feet; beautifully shaped

bright scarlet flowers flushed with carmine on the outer petals; blue base. In flower May 24 to June 6.

199. Mezza (Hogg & Robertson).—Height 20 inches; flowers with very broad round petals borne on very stout stems; colour delicate mauve shading to white; white base. In flower May 16 to May 29.

200. Minister Roell,  $\times \times \times$  May 24, 1900 (Hogg & Robertson).—Height 2 feet; flowers very large and shapely; colour crimson with a deeper base and white zone. In flower May 22 to June 4.

201. Minister Tak (Hogg & Robertson).—Height 26 inches; flowers large and of good shape, red suffused with rose; inky-blue base. In flower May 14 to June 1.

202. Mississippi (Hogg & Robertson).—Height 2 feet; flowers of good form, rosy purple with paler shadings towards the points of the petals; inky-blue base. In flower May 16 to May 27.

203. Miss Ormerod (Krelage).—Height 20 inches; large beautifully formed flowers, rosy purple with a paler reverse. The three inner petals are striped down the centre with white, and the base is deep blue. In flower May 15 to May 31.

204. Monseigneur Bottimanni (Hogg & Robertson).—Height 22 inches; flowers of excellent form with round petals; colour violet-lilac shading to pinkish lilac; base pale blue on a white ground. In flower May 23 to June 2.

205. Mr. Farncombe Sanders,  $\times \times \times$  May 16, 1900 (Krelage).—Height 26 inches; very large globular flowers of excellent form and substance; colour dark red with a white base shading to violet. Flowers very much larger than No. 176. In flower May 11 to May 31.

206. Mr. G. F. Wilson (Hogg & Robertson).—Height 2 feet; very free-flowering; flowers very large, bright red touched with carmine, inky-blue base. In flower May 14 to May 29.

207. Mr. W. Roberts (Hogg & Robertson).—Height 22 inches; beautifully formed crimson flowers suffused with rose on the outer petals, inky-blue base with a narrow white zone. In flower May 15 to June 1.

208. Olga (Krelage).—Height 18 inches; small excellently shaped flowers, delicate rose passing to white; white base. In flower May 14 to May 29.

209. Oliver Goldsmith (Hogg & Robertson). Height 20 inches; flowers large with broad thick petals; colour rosy magenta shaded with cerise on the exterior; inky-blue base. In flower May 15 to May 28.

210. Pales (Hogg & Robertson).—Height 20 inches; flowers rather small, lilac, with a paler reverse; yellow base with a very delicate blue zone. In flower May 16 to June 1.

211. Pense Amiere (Hogg & Robertson).—Height 2 feet; very free-flowering; flowers of moderate form, violet, slightly shaded with purple, white base. In flower May 15 to June 1.

212. Phœcia,  $\times \times \times$  May 16, 1900 (Hogg & Robertson).—Height 2 feet; bold, well-formed rosy scarlet flowers, the outer petals flushed with carmine, blue-black base. In flower May 12 to May 31.

213. Professor Balfour (Hogg & Robertson).—Very similar to No. 223.

214. Professor M. Foster,  $\times \times \times$  May 16, 1900 (Hogg & Robertson).—Height 27 inches; shapely flowers with stout petals; colour scarlet

suffused with rose and touched with carmine rose on the exterior ; inky-blue base. In flower May 16 to June 1.

215. Professor Trelease (Krelage).—Height 27 inches ; flowers very large, borne on rather slender stems ; colour rosy purple shading to mauve ; white base. In flower May 12 to May 28.

216. Reine Wilhelmina (Krelage).—Height 2 feet ; flowers of grand shape and very substantial ; colour delicate lilac with paler shadings ; sulphur-yellow base. In flower May 14 to May 31.

217. Rêve de Jeunesse (Krelage).—Height 26 inches ; flowers large and of good form, borne on rather slender stems ; colour violet, shading to mauve or lilac ; bluish white base. In flower May 12 to May 29.

218. Rev. G. A. Ellacombe (Hogg & Robertson).—Very similar to No. 223, but the flowers are not quite so large.

219. Rev. H. H. Dombam,  $\times \times \times$  May 16, 1900 (Hogg & Robertson). Height 2 feet ; beautifully shaped flowers of large size ; colour bright red touched with purple on the outer petals ; black base with a conspicuous white zone. In flower May 16 to June 6.

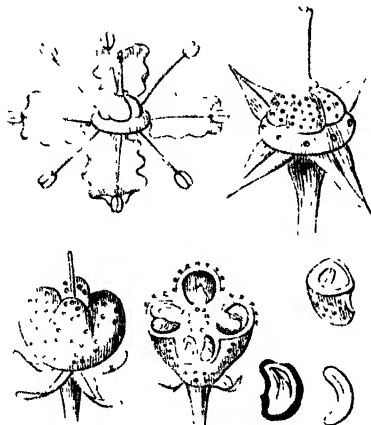
220. Sir Walter Scott (Hogg & Robertson).—Height 26 inches ; well-formed flowers, pinkish rose shaded with violet purple ; pale blue base. In flower May 16 to June 1.

221. Theodor Jorrison (Hogg & Robertson).—Height 26 inches ; flowers large and of great substance, purplish rose shaded with lilac ; blue and white base. In flower May 16 to June 1.

222. The Sultan (*syn.* Joseph Israels), A.M. May 5, 1896 (Hogg & Robertson).—Height 20 inches ; nicely formed flowers, deep maroon, almost black ; deep blue base. In flower May 11 to May 29.

223. Whistler (Krelage).—Height 22 inches ; bold, well-formed rich crimson flowers ; deep indigo blue base, with an irregular white zone. In flower May 15 to May 31.

224. Zephyr (Krelage).—Height 2 feet ; beautifully formed flowers with broad, substantial petals ; colour rosy lilac passing to pale rose ; light base. In flower May 12 to May 28.





# JOURNAL

OF THE

## ROYAL HORTICULTURAL SOCIETY.

VOL. XXV. 1901.

PART III.

### THE ROYAL HORTICULTURAL SOCIETY.

#### A RETROSPECT—1887 TO 1901.

[This Note was originally drawn up simply for the information of a Committee of the Council, but having been laid upon the table and considered by them, was ordered by the President and Council to be inserted in the next issue of the Society's *Journal*. Its origin may account for its possibly too great conciseness. W.W.]

THE opening of a new century is a good time for considering the progress or otherwise of the Society during recent years. The year 1887-8 is chosen because -

*First*—The records and accounts which have been handed down to us from a period earlier than that are never complete, and are sometimes absolutely wanting;

*Secondly*—It was the Society's last year of tenure at South Kensington; and

*Thirdly*—Its closing months gave birth to the new life and energy which have since permeated the old Society.

At the commencement of 1887 the Council and Officers of the Society were as follows: -

*President.* - Sir Trevor Lawrence, Bart., M.P.

*Treasurer.* - William Haughton.

*Secretary.* - William Lee.

*Council.* Colonel Beddome.

Hon. and Rev. J. T. Boscawen.

Colonel Trevor Clarke.

Sydney Courtauld.

Sir Michael Foster, F.R.S.

Dr. Hogg.

Sir Edmund Loder, Bart.

Major Mason.

George Maw.

Baron Schröder.

Sir William Thiselton-Dyer, K.C.M.G.

George F. Wilson, F.R.S.

*Assistant Secretary.*—Captain E. L. Bax.

*Garden Superintendent.*—A. F. Barron.

After the rearrangement concluded at the end of that eventful year of 1887 the new Council and Officers were :—

*President.*—Sir Trevor Lawrence, Bart., M.P.

*Treasurer.*—Dr. Morris, C.M.G.

*Secretary.*—Rev. W. Wilks, M.A.

*Council.*—Colonel Beddome.

Sir Michael Foster, F.R.S.

T. B. Haywood.

Dr. Hogg.

Sir Edmund Loder, Bart.

George Paul.

Baron Schröder.

A. H. Smee.

Sir William Thiselton-Dyer, K.C.M.G.

Harry J. Veitch.

George F. Wilson, F.R.S.

J. Woodbridge.

*Assistant Secretary.*—Charles J. Grahame.

*Garden Superintendent.*—A. F. Barron.

It was this Council which undertook, and laid the foundation of, the regeneration of the old Society, by bringing it back to its original design and limiting it strictly to a purely Horticultural policy.

At the close of 1887 there appear to have been a total of 1,329 Fellows, of whom 773 were Annual (*i.e.* subscribing) Fellows, and 556 were Life Fellows, the whole of whose commutation money had been previously spent on paying part of the South Kensington debts, and who consequently brought in no annual income whatever to the Society. It is, however, only right to say that whilst the majority of these Life Fellows cared little or nothing for the Horticultural policy of the Society, a few of them, like Sir Trevor Lawrence, Baron Schroder, Sir Edmund Loder, Mr. G. F. Wilson, Dr. Hogg, the Earl of Ducie, Mr. Courtauld, Mr. Veitch, and others, afforded very generous financial help to save the Society from the absolute ruin which stared it in the face.

How greatly the minority of the Fellows at that time resented the leaving South Kensington, and how little they appreciated the return to a purely Horticultural policy, is shown by the fact that at the end of 1887 and beginning of 1888 no less than 221 of them resigned, leaving a total of only 1,108 Fellows, of whom 556 were Life Fellows and only 552 were subscribing ones.

Of the 1,329 Fellows in 1887 only 773, as has been said, paid any subscription, and the subscription income of the Society during that year (1887) amounted to only £1,938, which was raised to a total income for the year of £2,894 by means of £522 from sale of garden produce, and other miscellaneous receipts from the Indian and Colonial Exhibition, &c. The general result being that the new Council had to take over a debt of £1,152; a general annual expenditure (which could not possibly be much reduced) of £3,500; and a subscription income of less than £2,000 a year.

Such was briefly the position of affairs at the end of 1887 when the newly constituted Council and Officers undertook the apparently hopeless task of rescuing the old Society and reconstituting it upon its original and purely Horticultural basis. And that their task was not an easy or a cheerful one may be gathered from the fact already mentioned that out of the small number of 773 subscribing Fellows, on whom alone they could depend for income, no less than 221 at once resigned!

Bearing in mind, then, the three chief difficulties in the Council's way—

(1) A debt of £1,152 ;

(2) A number of Life Fellows from whom no annual income whatsoever accrued—a number in the early days of 1888 actually exceeding the number of subscribing Fellows ;

(3) An irreducible annual expenditure of £1,500 a year more than the annual subscription income—

bearing these three chief difficulties in mind, glance at the following table of figures and judge of the work of the Council during the twelve years that have passed away since then—

Year	Expenditure	Annual Increase or Decrease of Expenditure	Income	Annual Increase or Decrease of Income	Investments	Annual Increase of Investments	Year
	£	£	£	£	£	£	
1887	3,577	—	2,894		Debt 1,152	—	1887
1888	3,412	- 165	3,617	+ 723			1888
1889	3,960	+ 548	3,520	- 97			1889
1890	3,866	- 94	4,102	+ 582			1890
1891	4,182	+ 316	4,439	+ 337			1891
1892	4,872	+ 690	4,873	+ 434	479	479	1892
1893	5,193	+ 321	5,591	+ 718	479		1893
1894	5,076	117	5,550	- 41	975	+ 496	1894
1895	5,073	- 3	5,638	+ 88	1,768	+ 793	1895
1896	5,788	+ 715	5,944	+ 306	2,325	557	1896
1897	5,481	307	6,303	+ 359	2,325	—	1897
1898	5,810	+ 329	7,104	+ 801	3,691	1,366	1898
1899	6,069	+ 259	7,820	+ 716	6,154	+ 2,463	1899
1900	6,553	+ 484	8,193	+ 373	8,156	+ 2,002	1900
1901	—	—	—	—	10,237	+ 2,081	1901

\* The Davis and Parry Legacies, amounting to £2,122, are not included in the investments in this table, as they have no bearing on the fluctuations of the Society's financial position.

The increase in the number of Fellows—there has been no decrease since 1887, in which year it was 235; for even the resignation of 221 in the early part of 1888 was more than balanced by the influx of new Fellows later in the same year—the annual increase has not been included in the above table, because it would involve an enormous amount of checking and counter-checking of the figures. Suffice it to say that from a total of 1,108 Fellows in 1888, of whom 556 were Life Fellows of the old régime (*i.e.* whose commutation money had been previously

spent), the number has steadily increased, until on January 1, 1901, we have—

- (1) The debt of £1,152 wiped off.
- (2) An income of £8,000 a year.
- (3) The Society's *Journal*, which had fallen into abeyance, revived.
- (4) A sum of £10,237 invested—not including the £2,122 of the Davis and Parry Trusts ;
- (5) 4,750 Fellows, &c., of whom only 250 are Life Fellows of the old régime ; and
- (6) Notwithstanding the enormous increase in the number of Fellows, and of clerical work in the preparation of the *Journal*, general correspondence, office work, &c., the office staff, which in 1887 consumed 17½ per cent. of the Society's income, in 1900 only required 8½ per cent.

The President and Council may, we think, look back with something more than satisfaction on the success which has crowned their efforts, and their best hope for their successors for the next twelve years must be that the year 1913 may show as marked an improvement in the prosperity of the Society over 1901 as 1901 does over the commencement of 1888.

The following form the Council and chief Officers to-day :—

*President*—Sir Trevor Lawrence, Bart., V.M.H.

*Vice-Presidents*—The Right Hon. the Earl of Ducie.

The Right Hon. Lord Rothschild.

The Right Hon. Joseph Chamberlain, M.P.

Baron Sir Henry Schroder, Bart., V.M.H.

Sir Frederick Wigan, Bart., M.P.

*Treasurer*—J. Gurney Fowler.

*Council*—John T. Bennett-Poë.

Rev. Hugh Berners, M.A.

George Bunyard, V.M.H.

Captain G. Lindsay Holford, C.I.E., M.V.O.

James Hudson, V.M.H.

The Right Hon. the Earl of Ilchester.

Sir John T. D. Llewelyn, Bart.

Frederick G. Lloyd.

William Marshall.

Henry B. May.

Alfred H. Pearson.

Charles E. Shea.

Harry J. Veitch,<sup>1</sup> F.L.S.

*Professor of Botany*—Rev. Geo. Henslow, M.A., V.M.H.

*Consulting Chemist*—Dr. Augustus Voelcker, M.A.

*Foreign Corresponding* }  
*Secretary* } Maxwell T. Masters, M.D., F.R.S.

*Secretary*—Rev. William Wilks, M.A.

*Garden Superintendent*—S. T. Wright.

*Cashier*—Frank Reader.

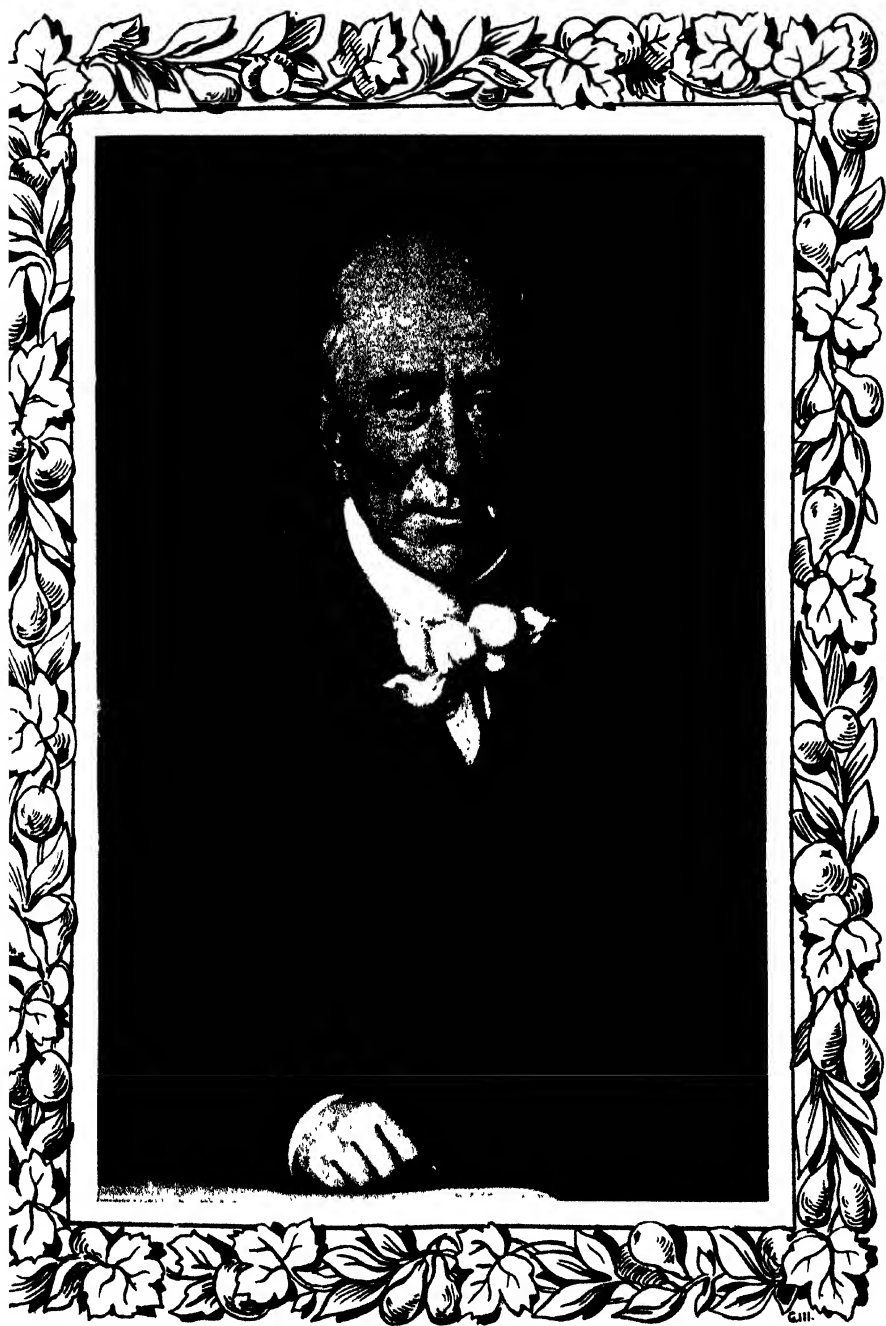


FIG. 112.—THOMAS ANDREW KNIGHT, F.R.S. (*Gardeners' Magazine*.)  
President of the Royal Horticultural Society, 1811-1838.



## SEVENTH ANNUAL EXHIBITION OF BRITISH-GROWN FRUIT.

Held at the Crystal Palace, September 27, 28, & 29, 1900.

THE year 1900 will long be remembered by British fruit growers for its large crop of Apples, and its immense crop of Pears, Plums, and Peaches; indeed the irrepressible grumbler, unable for once to find much fault with the weather of 1900, was compelled to fall back on the over-abundance of most hardy fruits, and without doubt where thinning was not or could not be practised the crops were too large to allow of really fine fruits being produced in any quantity, or of the produce commanding high prices. It was therefore only to be expected that the Society's great Autumn Fruit Show this year should be somewhat below exhibition size as regards the fruit shown, and greatly above the average as regards the number of entries. And this expectation was fully realised, for the entries in the Classes showed a large increase, and though there were plenty of magnificent samples to be seen in all the Divisions and Classes, at the same time there were also smaller fruits than are usually seen at these Shows. Nor is this entirely to be regretted, for after all a moderate-sized Apple or Pear is, generally speaking, of superior flavour to one of gigantic proportions, and is far more convenient to the consumer whether he use Nature's appliances or the more polite knife and fork. Even sitting at table, a very large Pear is unwieldy and is apt to roll off one's plate; and the mere taking the monster makes the least selfish feel greedy. Fruits of moderate size, well grown, well coloured, and well ripened, should always find favour.

In their Annual Report the Council remark:—

As an object-lesson in British Fruit cultivation this Annual Show stands unrivalled, and is of national importance. Those who have visited it from year to year cannot fail to have been impressed by the wonderful advance which has been made in the quality of the hardy fruits exhibited. And as the importance of fruit-growing in this country cannot well be over-estimated, the Council invite Fellows and their friends to support them in their efforts to maintain and improve this Exhibition by visiting it, and by subscribing to its funds. For it cannot be too widely known that the continuance of the Show is absolutely dependent on at least £100 being raised by subscription each year towards the Prize Fund. The Show involves the Society in a very large expenditure without the possibility of any financial return. The Council cannot therefore continue it unless sufficient interest is taken in it by Fellows and their friends to provide £100 towards the Prize Fund. And this will, in coming years, be even more important than heretofore, as the Directors of the Palace have

signified to the Council that they feel compelled to decrease their contribution by £50. A glance at the list of subscribers will show how small has been the interest taken by the bulk of the Fellows. The Council would point out that this is not a local show with a few large prizes, but that a large number of small prizes have been provided in order to secure the best fruits in each section; special prizes have been allotted to Market Growers; and Counties have been grouped in such a way that growers should not have to compete with exhibitors from localities more favoured by climatic conditions. These points will be still further extended should sufficient financial support be forthcoming. Subscriptions should be sent at once to the Secretary, 117 Victoria Street, Westminster, and if the list prove satisfactory the Schedule will be issued in April, and the Show held on October 10th, 11th, and 12th, 1901.

## LIST OF SUBSCRIBERS TO THE PRIZE FUND, 1900.

Donations to this Fund are earnestly requested, and will be acknowledged in the *Society's Journal*

	£	s.	d.
Apthorpe, W. H., Hills Road, Cambridge . . . . .	0	10	6
Balderson, H., Corner Hall, Hemel Hempstead . . . . .	1	1	0
Basham, John, Furzok, Bassaleg, Newport, Mon. . . . .	0	10	6
Beebe, A. G., Palace Road, Streatham . . . . .	0	10	6
Blaker, Dr. E. S., East Grinstead . . . . .	0	10	6
Blenkinsop, B., J.P., Kenley, Surrey . . . . .	0	10	0
Boyd, Mrs., Woodvale Lodge, South Norwood Hill . . . . .	0	5	0
Brocklehurst, G. W., Rock House, Sydenham Hill . . . . .	1	1	0
Bunyard, Messrs. G. & Co., Royal Nurseries, Maidstone . . . . .	10	10	0
Caddy, J., Ruskinville, Dalton-in-Furness . . . . .	1	1	0
Carter, A. J., Billingshurst, Sussex . . . . .	0	5	0
Challis, T., The Gardens, Wilton House, Salisbury . . . . .	0	5	0
Cheal, Messrs. J. & Sons, Crawley, Sussex . . . . .	2	2	0
Clinch, T., Key Street, Sittingbourne . . . . .	0	2	6
Clont, Richard, Broome House, West Malling . . . . .	2	2	0
Cole, F., Swallowfield Park, Reading . . . . .	1	0	0
Colman, Jeremiah, Gatton, Reigate . . . . .	2	2	0
Coode, R. C., Polapit Tainar, Launceston . . . . .	1	1	0
Cundey, Mrs., 2 Hyde Park Square, W. . . . .	2	2	0
Day, James, Galloway House, Garliestown . . . . .	0	7	6
Dixon, James, Dover Street, Hull . . . . .	0	5	0
Edwards, R., Beechy Lees, Otford, Sevenoaks . . . . .	0	5	0
Fennell, G., Fairlawn Gardens, Tonbridge . . . . .	0	5	0
Fletcher, Charles E., Kenward, Yalding, Kent . . . . .	0	5	0
Fowke, Miss, Wrockwardine Hall, Wellington, Salop . . . . .	0	10	6
Fowler, J. Gurney, Glebeland, Woodford . . . . .	2	2	0
Gabriel, John T., Palace Road, Streatham Hill . . . . .	1	1	0
Garside, J., Ladbroke Gardens, Garstang . . . . .	0	4	0
Greaves, B., Broome Hall Gardens, Dorking . . . . .	0	5	0
Haywood, T. B. (the late), Woodhatch, Reigate . . . . .	2	2	0
Hill, Daniel, Herga, Watford . . . . .	0	10	0
Horne, Wm., & Sons, Cliffe, Rochester . . . . .	2	2	0
Hulse, Miss A., Boxgrove, Guildford . . . . .	1	0	0
Ince, Surgeon-Lieut.-Col. J., Swanley, Kent . . . . .	0	5	0
Kay, Peter E., Church End, Finchley, N. . . . .	1	1	0
Kemp, A., Coolhurst Gardens, Horsham . . . . .	0	5	0

King, E. Powell, Wainsford, Lymington . . . . .	0	10	0
King, Miss M. J. (the late), Burghfield, by Reading . . . . .	1	1	0
Lawrence, Sir Trevor, Bart., Burford, Dorking . . . . .	1	1	0
Lloyd, F. G., Langley House, Bucks . . . . .	3	3	0
McIndoe, J., Hutton Hall Gardens, Guisborough . . . . .	1	0	0
McKenzie, John, Linton Gardens, Maidstone . . . . .	0	10	6
McLachlan, R., F.R.S., 23 Clarendon Road, Lewisham . . . . .	2	2	0
McLaren, Mrs. E., 56 Ashley Gardens, S.W. . . . .	1	1	0
Merryweather, H., The Nurseries, Southwell . . . . .	2	15	0
Michael, W. A., The Hermitage, East Liss, Hants . . . . .	0	5	0
Mouroe, George, Covent Garden Market, W.C. . . . .	2	2	0
Oliver, Mrs., Bolton Percy, Yorks . . . . .	0	9	0
Paulin, W. T., Winchmore Hill, N. . . . .	2	2	0
Pearson & Sons, Lowdham, Chilwell, Notts . . . . .	2	0	0
Peed, J., & Sons, Notwood Road, West Norwood . . . . .	2	2	0
Planck, Surgeon-General C., Lyden Croft, Edenbridge . . . . .	1	0	0
Potter, R., Keimring, Sevenoaks . . . . .	0	7	6
Poupart, W. J., Marsh Farm, Twickenham . . . . .	1	1	0
Reid, J. W., Holly Walk, Leamington Spa . . . . .	0	10	6
Richards, A., 26 Duke's Avenue, Chiswick . . . . .	0	10	6
Rivers & Son, T., Sawbridgeworth . . . . .	5	5	0
Roberts, J., Whitebirch, Hampton-on-Thames . . . . .	0	10	6
Ross, Chas., Welford Park Gardens, Newbury . . . . .	0	10	6
Rothschild, Leopold de, New Court, St. Swithin's Lane, E.C. . . . .	3	3	0
Saunders, F. G., Caversham Grove, Reading . . . . .	0	10	6
Savory, Rev. E., Bracknell, Berks . . . . .	0	10	0
Schroder, Baron, The Dell, Staines . . . . .	5	0	0
Sharpe, F., Sileby, near Loughborough . . . . .	0	2	6
Sherwood, N. N., Dunedin, Streatham Hill . . . . .	1	1	0
Smith, E., Ingleside, Chatham . . . . .	1	1	0
Sneyd, Miss, 48 Holland Park Avenue, W . . . . .	0	5	0
Somes, Mrs., Annery, Bideford . . . . .	1	1	0
Southby, P., Bampton, Faringdon, Berks . . . . .	0	5	0
Spooner, S., & Sons, Hounslow . . . . .	1	1	0
Sutton & Sons, Reading . . . . .	5	0	0
Sydenham, R., Birmingham . . . . .	1	1	0
Thomas, W. F., Hillingdon, Uxbridge . . . . .	2	0	0
Thomson, Mrs. Lindsay, 24 Netherall Gardens, South Hampstead . . . . .	0	5	0
Tidy, W., Stanmore Hall Gardens, Middlesex . . . . .	0	5	0
Turton, T., Castle Gardens, Sherborne . . . . .	0	10	6
Veitch, Jas., & Sons, Royal Exotic Nurseries, Chelsea . . . . .	5	0	0
Walker, J., Ham Common, Richmond, Surrey . . . . .	1	1	0
Wallace, L. A., Sanderstead Court, Surrey . . . . .	5	0	0
Wellington, Duke of, Apsley House, Piccadilly . . . . .	1	0	0
Wells, H. C., J.P., Broomfield Lodge, Chelmsford . . . . .	1	1	0
White, Mrs., Walton Hall, Kelso, N.B. . . . .	1	0	0
Wigan, James, Cromwell House, Mortlake . . . . .	0	10	0
Willard, J., Holly Lodge Gardens, Highgate . . . . .	0	10	6
Willmott, Miss, Great Warley, Essex . . . . .	1	1	0
Woodward, G., Burham Court, Teston, Maidstone . . . . .	1	0	0
Wyatt, A., Hatton, Middlesex . . . . .	1	0	0
Wythes, Geo., Syon House Gardens, Brentford . . . . .	1	1	0

The following table may be interesting as comparing the number of dishes of each fruit exhibited in each of the seven years during which the Show has been held. Only exhibits under the Schedule have been

included, it having been found impossible to enumerate everything shown not for competition.

Dishes of	1894	1895	1896	1897	1898	1899	1900
Apples . . .	1,027	1,938	1,083	1,485	1,494	2,203	2,069
Apricots . . .	2	1	1	1	1	—	—
Bananas . . .	—	1	—	—	—	—	—
Blackberries . . .	—	—	—	—	1	—	—
Bullaces . . .	5	3	1	3	1	—	—
Cherries . . .	7	12	6	1	1	2	5
Crab Apples . . .	—	—	—	—	—	6	27
Currants . . .	—	—	—	—	2	1	—
Damsons . . .	6	18	4	5	15	13	10
Figs . . .	4	9	7	26	10	9	9
Gooseberries . . .	1	—	—	—	2	—	—
Grapes . . .	105	97	135	120	115	83	113
Medlars . . .	—	2	3	5	4	5	2
Melons . . .	—	10	7	8	5	4	12
Mulberries . . .	—	—	—	—	—	2	—
Nectarines . . .	15	18	4	11	29	19	52
Nuts . . .	—	26	19	10	14	10	14
Passiflora . . .	—	—	1	1	—	—	—
Peaches . . .	51	80	24	77	96	67	128
Pears . . .	829	779	795	677	694	842	1,099
Pines . . .	—	—	5	3	1	2	2
Plums . . .	90	101	38	115	214	79	284
Quinces . . .	6	14	17	1	2	5	3
Raspberries . . .	—	—	—	—	2	1	2
Strawberries . . .	—	—	—	—	2	—	4
Tomatos . . .	—	67	2	3	6	5	6
Total . . .	2,148	3,176	2,152	2,552	2,711	3,358	3,841
Entries for com- petition . . .	1,301	1,783	1,234	1,329	1,332	1,297	1,505
Visitors . . .	23,680	36,293	26,499	27,242	29,281	30,150	40,787

### THE JUDGES.

The following gentlemen kindly acted as judges, and deserve the best thanks of the Society for their oftentimes very difficult work, viz. :—

Assbee, J., Covent Garden, W.C.

Basham, J., Bassaleg, Newport, Mon.

Bates, W., Poulett Lodge Gardens, Twickenham.

Blair, P., Trentham Gardens, Staffordshire.

Beckett, E., Aldenham House Gardens, Elstree.

Bunyard, G., V.M.H., Royal Nurseries, Maidstone.

Challis, T., Wilton House Gardens, near Salisbury.

Cheal, Jos., Crawley, Sussex.

Coomber, T., The Hendre Gardens, Monmouth.

Crump, W., V.M.H., Madresfield Court Gardens, Malvern.

Dean, A., 62 Richmond Road, Kingston.

Divers, W. H., The Gardens, Belvoir Castle, Grantham.

Douglas, J., V.M.H., Edenside, Great Bookham, Surrey.

Empson, W. J., Ampthill House Gardens, Ampthill.

Farr, Wm., Spring Grove House Gardens, Isleworth.

Fielder, C. R., North Mymms.  
 Fyfe, W., Lockynge Park, Wantage.  
 Gleeson, M., Warren House Gardens, Stanmore.  
 Herrin, C., Rosebery Villa, Bourne End, Maidenhead.  
 Hudson, J., V.M.H., Gunnersbury House Gardens, Acton, W.  
 Iggulden, W., Frome.  
 Kay, Peter, V.M.H., Church Road, Finchley, N.  
 Markham, H., Northdown House Gardens, Margate.  
 McIndoe, J., V.M.H., Hutton Hall Gardens, Guisboro'.  
 Molyneux, E., V.M.H., Swanmore Park, Bishop's Waltham.  
 Mortimer, S., Farnham, Surrey.  
 Norman, G., Hatfield House Gardens, Hatfield.  
 Parker, R., Goodwood, Chichester.  
 Pearson, A. H., The Gables, Pelham Road, Sherwood Rise, Nottingham.  
 Pope, W., Highclere Gardens, Newbury.  
 Poupart, W., Marsh Farm, Twickenham.  
 Reynolds, G., The Gardens, Gunnersbury Park, Acton, W.  
 Rivers, Somers, Sawbridgeworth.  
 Ryder, E., Orpington, Kent.  
 Salter, C. J., Woodhatch Gardens, Reigate.  
 Smith, J., V.M.H., Mentmore Gardens, Leighton Buzzard.  
 Walker, J., Ham Common, Surrey.  
 Ward, A., Stoke Edith Park, Hereford.  
 Willard, J., Holly Lodge Gardens, Highgate.  
 Woodward, G., Barham Court, Teston, Maidstone.

### THE REFEREES.

The following gentlemen very kindly held themselves at the disposal of the Society to act as referees if required, viz.—

Crowley, Philip, the late, Waddon House, Croydon.  
 Monroe, G., V.M.H., Covent Garden, W.C.  
 Thomas, Owen, V.M.H., Royal Gardens, Windsor.  
 Tillman, H. E., Covent Garden, W.C.  
 Wright, J., V.M.H., Rose Hill Road, Wandsworth.  
 Wythes, G., V.M.H., Syon House Gardens, Brentford.

### OFFICIAL PRIZE LIST.

(The address and the Gardener's name are entered on the first occurrence, but afterwards only the Owner's name is recorded.)

#### DIVISION I.

*Fruits, grown under Glass or otherwise.*

**Open to Gardeners and Amateurs only.**

NOTE.—Exhibitors can compete in one Class only of Classes 1, 2; and of Classes 3, 4.

**Class 1.**—Collection of 9 dishes of Ripe Dessert Fruit:—6 kinds at least; only 1 Pine, 1 Melon, 1 Black and 1 White Grape allowed; not



FIG. 113. -COLLECTIONS OF FRUITS AT THE SOCIETY'S SHOW. SEPTEMBER 27, 28, 29. (*Journal of Horticulture*.)

more than 2 varieties of any other kind, and no two dishes of the same variety. Fig. 113.

First Prize, Silver Cup, presented by Sholto H. Hare, Esq., and £4 ;  
Second, £4 ; Third, £2.

1. Earl of Harrington, Derby (gr. J. H. Goodacre).
2. Lady Henry Somerset, Ledbury (gr. G. Mullins).
3. Sir J. W. Pease, Bart., Guisboro' (gr. J. McIndoe, V.M.H.).

**Class 2.**—Collection of 6 dishes of Ripe Dessert Fruit :—4 kinds at least ; only 1 Melon, 1 Black and 1 White Grape allowed ; not more than 2 varieties of any other kind, and no two dishes of the same variety. Pines excluded.

First Prize, Silver Knightian Medal and £3 ; Second, £2. 10s. ;  
Third, £1. 5s.

1. J. W. Fleming, Esq., Romsey (gr. W. Mitchell).
2. M. Biddulph, Esq., Ledbury (gr. J. Dawes).
3. C. Swinfin Esq., Weybridge (gr. J. Lock).

**Class 3.**—Grapes, 6 distinct varieties, 3 bunches of each, both Black and White must be represented.

First Prize, Silver Challenge Cup, value Fifty Guineas, and £3 ;  
Second, £3 ; Third, £2.

THE CHALLENGE CUP was presented to the Society by Messrs. Wm. Wood & Son, of Wood Green, in celebration of the Jubilee Year of their Firm. The Winner will hold the Cup for 12 months only, when it will be again offered for competition, until it eventually becomes the property of the Exhibitor who shall have won it three years in succession.

1. Earl of Harrington (second year of winning the Cup).
2. C. Bayer, Esq., Forest Hill (gr. W. Taylor).
3. No award.

**Class 4.**—Grapes, 3 distinct varieties, 3 bunches of each.

First Prize, £2. 10s. ; Second, £1. 10s. ; Third, £1.

1. Lord Hastings, Melton Constable (gr. W. Shingles). Fig. 114.
2. M. Biddulph, Esq.
3. C. S. Eady, Esq.

**Class 5.**—Grapes, Black Hamburgh, 3 bunches.

First Prize, £1. 10s. ; Second, £1 ; Third, 10s.

1. J. W. Fleming, Esq.
2. Lord Hillingdon, Uxbridge (gr. A. K. Allan).
3. C. R. Scrase Dickens, Esq., Horsham (gr. A. Kemp).

**Class 6.**—Grapes, Madresfield Court, 3 bunches.

First Prize, £1. 10s. ; Second, £1.

1. J. W. Fleming, Esq.
2. C. Bayer, Esq.

**Class 7.**—Grapes, Mrs. Pince, 3 bunches.

First Prize, £1. 10s. ; Second, £1.

1. J. W. Fleming, Esq.
2. Duchess of Cleveland, Battle Abbey (gr. W. Camm).

**Class 8.**—Grapes, Alicante, 3 bunches.

First Prize, £1. 10s. ; Second, £1 ; Third, 10s.

1. Lord Hastings.
2. J. W. Fleming, Esq.
3. Lady A. Tate, Streatham Common (gr. W. Howe).



FIG 114.—ALNWICK SEEDLING GRAPES, SHOWN BY LORD HASTINGS. (*Gardeners' Magazine*.)

**Class 9.**—Grapes, Lady Downes (Black), 3 bunches.

First Prize, £1. 10s. ; Second, £1.

1. C. Bayer, Esq.
2. J. W. Fleming, Esq.

**Class 10.**—Grapes, any other Black Grape, 3 bunches.

First Prize, £1. 10s. ; Second, £1 ; Third, 10s.

1. Lord Hastings.
2. Lord Suffield, Norwich (gr. W. Allan).
3. Miss Ridge, Englefield Green (gr. G. Lane).

**Class 11.**—Grapes, Muscat of Alexandria, 3 bunches.

First Prize, £2. 10s. ; Second, £1. 10s. ; Third, £1.

1. Lord Hillingdon.
2. Earl of Harrington.
3. W. Greenwell, Esq., Marden Park (gr. W. Lintott).



FIG. 115.—POT PLUM. (*The Garden.*)

**Class 12.**—Grapes, Mrs. Pearson.

First Prize, £2 ; Second, £1. 10s.

1. Lord Hastings.
2. No award.

**Class 13.**—Grapes, any other White Grape, 3 bunches.

First Prize, £1. 10s. ; Second, £1 ; Third, 10s.

1. C. Bayer, Esq.
2. Miss Ridge.
3. H. A. Attenborough, Esq., Paventry (gr. A. Child).

**Class 14.**—Peaches from under glass, 1 dish of one variety.

First Prize, 10s. ; Second, 7s.

1. J. W. Fleming, Esq.
2. J. B. Fortescue, Esq., Maidenhead (gr. J. A. Rogers).

**Class 15.**—Nectarines, from under glass, 1 dish of one variety.

First Prize, 10s. ; Second, 7s.

1. Lady Henry Somerset.
2. F. W. Thomas, Polegate.

**Class 16.**—Dessert Plums or Gages, from under glass, 3 dishes distinct.

First Prize, 15s. ; Second, 10s.

1. Leopold de Rothschild, Esq., Acton (gr. J. Hudson, V.M.H.).
2. Earl of Harrington.

**Class 17.**—Collection of Hardy Fruit, 50 dishes distinct, grown entirely in the open ; not to include more than 18 varieties of Apples or 12 of Pears.

First Prize, The Hogg Medal and £3 ; Second, £2 ; Third, £1.

1. A. de Rothschild, Esq., Halton (gr. R. C. Sanders).
2. T. L. Boyd, Esq., Tonbridge (gr. E. Coleman).

**Class 18.**—Collection of Hardy Fruit, 12 dishes distinct, grown partly or entirely under glass to illustrate Orchard House Culture ; Grapes excluded. Figs. 115, 116.

First Prize, £1. 10s. ; Second, £1.

1. Sir J. W. Pease, Bart.
2. Sir M. W. Collet, Bart., Sevenoaks (gr. R. Potter).

## DIVISION II.

## Open to Nurserymen only.

Nurserymen must exhibit as individuals or as firms, and must have actually grown all they exhibit. Combinations of individuals or firms are not allowed, nor collections of produce from districts.

Nurserymen desiring to exhibit at this Show must make application for either Class 19, 20, or 21 ; and also for 22 if they wish to show fruit grown under glass. No other spaces but the above can be allotted to Nurserymen wishing to show Fruit. Exhibitors can only enter in one of Classes 19, 20, and 21.

Nurserymen may adopt any method of staging they desire subject to the following reservations : (a) The number of Fruits is not limited by Note iii., page 4, but the Baskets or Dishes must not exceed 15 inches in diameter if circular, or 19 × 15 if rectangular ; (b) Duplicate Trees are permitted but not duplicate Baskets or Dishes of Fruit ; (c) Trees are not admissible in 19, 20, 21 ; (d) A decorative central trophy not exceeding 4 feet square at the base is allowed as an extra, and the fruit thereon will not be subject to the rule (b) as to duplicates.

No Awards of any sort will be made to Nurserymen who do not conform to the above regulations.

Nurserymen having entered and finding themselves unable to exhibit are *particularly* requested to give three days' notice to the Superintendent, R.H.S. Gardens, Chiswick, London, W.



FIG. 116.—PLUM GRAND DUKE. (*Journal of Horticulture*.)

Allotment of table-space will be made to Nurserymen on the three following scales:—

*For Fruit grown entirely out of doors.*

**Class 19.**—48 feet run of 6 feet tabling.

First Prize, Gold Medal; Second, Hogg Medal; Third, Silver-gilt Knightian Medal.

1. Messrs. G. Bunyard & Co., Maidstone.

**Class 20.**—32 feet run of 6 feet tabling.

First Prize, Hogg Medal; Second, Silver-gilt Knightian;  
Third, Silver-gilt Banksian.

1. Mr. J. Basham, Bassaleg.

2. Messrs. J. Cheal & Sons, Crawley.

3. Messrs. J. Laing & Sons, Forest Hill.

**Class 21.**—16 feet run of 6 feet tabling.

First Prize, Silver-gilt Knightian; Second, Silver-gilt Banksian;  
Third, Silver Knightian.

1. Messrs. J. Peed & Son, West Norwood.

2. Messrs. G. Cooling & Sons, Bath.

For Orchard House Fruit and Trees.

*For Fruit grown under glass.*

**Class 22.**—32 feet run of 6 feet tabling.

First Prize, Gold Medal; Second, Hogg Medal; Third, Silver-gilt Knightian Medal.

1. Messrs. T. Rivers & Son, Sawbridgeworth.

### DIVISION III.

Open to Market Growers only.

Gentlemen's-Gardeners or Amateurs, who sell surplus fruit, and Nurserymen, are excluded from this division.

Market Growers must exhibit as individuals or as firms, and must have actually grown all they exhibit. Combinations of individuals or firms are not allowed, nor collections of produce from districts.

With the exception of Class 36, all Fruits must be shown "as packed for travelling to Market," except that all lids, covering paper, and other surface packings are to be turned back (not removed), so as to display contents. *Boxes or Baskets piled up above the edge or rim will be considered "unsuitable for travelling," and will be disqualified.*

Other things being equal, a sieve or bushel of Apples or Pears will be considered to weigh **about** 42 lb. and a half-sieve or half-bushel 20 lb., or of Plums 28 lb., more or less.

The Judges will be men thoroughly conversant with the Market, and in awarding the Prizes they will be instructed to consider not only the quality of the Fruit, but also the Packing, the Grading, and the Suitability for travelling and for Market purposes of the box, basket, or other receptacle in which the fruit is shown.

**Class 23.**—Grapes, Hamburgh, a single layer, weighing not less than 12 lb., in a baby basket.

First Prize, £2; Second, £1. 10s.

1. Mr. W. Iggulden, Frome.

2. Mr. W. Poupert, Twickenham.

**Class 24.**—Grapes, White, any variety, a single layer, weighing not less than 12 lb., in a baby basket.

First Prize, £2; Second, £1. 10s.

1. Messrs. W. J. & J. C. Batho, Finchley.
2. Mr. W. Iggulden.

**Class 25.**—Grapes, any variety, in any other package than a baby basket, for Market.

No Prize to be awarded unless the Judges consider the box, basket, or other receptacle *superior* for transit by rail to baby baskets in flats.

First Prize, £2; Second, £1. 10s.

1. Mr. J. Gore, Polegate.
2. Mr. W. Green, Harold Wood.

**Class 26.**—Apples, Cooking, 4 varieties, about 42 lb. net of each, in baskets or boxes.

First Prize, £1. 10s.; Second, £1.

1. Mr. W. Poupart.
2. Mr. G. S. Tebbutt, Isleworth.

**Class 27.**—Apples, Dessert, 4 varieties, about 20 lb. net of each, in baskets or boxes.

First Prize, £1. 10s.; Second, £1.

1. Mr. W. Poupart.
2. Mr. G. S. Tebbutt.

**Class 28.**—Apples, Cooking, 2 varieties, about 20 lb. net of each, in baskets or boxes.

First Prize, £1; Second, 15s.

1. Mr. E. Basham, Bassaleg.
2. Mr. G. S. Tebbutt.

**Class 29.**—Apples, Dessert, 2 varieties, about 20 lb. net of each, in baskets or boxes.

First Prize, £1; Second, 15s.

1. Messrs. Campbell & Getting, Ross.
2. Mr. W. Poupart.

**Class 30.**—Apples, Cooking, any one variety, about 42 lb. net, in a basket or box.

First Prize, 15s.; Second, 10s.

1. Messrs. Campbell & Getting.
2. Mr. A. J. Adcock, Ipswich.

**Class 31.**—Apples, Dessert, any one variety, about 20 lb. net, in a basket or box.

First Prize, 15s.; Second, 10s.

1. Mr. W. Poupart.
2. Mr. A. Wyatt, Hatton.

**Class 32.**—Apples, about 42 lb. net, of any one variety, in any Improved Form of Package for Market.

No Prize will be awarded unless the Judges consider the box, basket, or other receptacle *superior* to those in ordinary use.

First Prize, £1; Second, 15s.

1. Mr. E. Basham.

**Class 33.**—Apples, about 42 lb. net, of any one variety, showing any Improved System of Packing.

First Prize, £1; Second, 15s.

1. Mr. E. Basham.
2. Mr. W. Poupart.

**Class 34.**—Pears, 2 varieties, in 2 packages of about 20 lb. capacity each.

First Prize, £1; Second, 15s.

1. Mr. A. Wyatt.
2. Mr. W. Poupart.

**Class 35.**—Pears, from 24 to 48 Fruits, according to size, of any one Choice Dessert variety, suitably packed in one package for Market.

First Prize, 15s.; Second, 10s.

1. Mr. W. Poupart.
2. Mr. A. Wyatt.

**Class 36.**—Collection of 12 varieties of Apples and 6 of Pears, distinct. 18 Fruits of each, to be laid flat on the table without dishes or baskets. Only Vine or similar Leaves allowed for Decoration.

First Prize, £4. 10s.; Second, £3.

1. Mr. W. Poupart.
2. Messrs. W. J. Lobjoit & Son, Hounslow.

**Class 37.**—Plums, Cooking, a basket or box of about 28 lb. capacity of any one variety.

First Prize, 15s.; Second, 10s.

1. Mr. W. Poupart.
2. Mr. A. Wyatt.

**Class 38.**—Plums, from 24 to 48 Fruits of any Choice Dessert variety, suitably packed in one package for Market.

First Prize, 15s.; Second, 10s.

1. Mr. J. Gore.
2. Mr. W. Iggulden.

**Class 39.**—Peaches, 24 Fruits of one or more varieties, packed in a suitable box.

First Prize, £1. 10s.; Second, £1.

Superiority of the packing and of the system of packing to be especially considered in this class.

1. Mr. J. Gore.
  2. Mr. W. Poupart
  2. Mr. T. Bones, Cheshunt
- } equal.

**Class 40.**—Tomatos, a basket or box of about 12 lb. capacity suitably packed.

First Prize, 15s. ; Second, 10s.

1. Mr. C. Moon, Surbiton.
2. Mr. W. Poupart.

#### DIVISION IV.

##### *Fruits grown in the Open Air.*

Open to Gardeners and Amateurs only. Nurserymen and Market Growers excluded.

**NOTE.** Exhibitors can compete in one Class only of the Classes 41, 42, 43 ; of 44, 45 ; of 46, 47 ; of 48, 49, 50, 51, 52 ; of 54, 55 ; of 56, 57 ; of 58, 59 ; of 61, 62. In distinguishing Dessert and Cooking varieties, see Official List printed in the Schedule.

**Class 41.**—Apples, 24 dishes, distinct, 16 Cooking, 8 Dessert. The latter to be placed in the front row.

First Prize, £3. 10s. ; Second, £2 ; Third, £1. 10s.

1. Roger Leigh, Esq., Maidstone (gr. Geo. Woodward).<sup>\*</sup>
2. A. H. Smee, Esq., Hackbridge (gr. W. E. Humphreys).
3. South-Eastern Agricultural College, Wye, Kent (S. Deadman).

**Class 42.**—Apples, 12 dishes, distinct, 8 Cooking, 4 Dessert. The latter to be placed in the front row.

First Prize, £2 ; Second, £1 ; Third, 15s.

1. Sir M. W. Collet, Bart.
2. Col. H. Walpole, Winchfield (gr. A. Maxim).
3. O. E. Avigdor-Goldsmid, Esq., Tonbridge (gr. C. Earl).

**Class 43.**—Apples, 9 dishes, distinct, 6 Cooking, 3 Dessert. The latter to be placed in the front row.

First Prize, £1. 10s. ; Second, 15s. ; Third, 10s.

1. Duke of Fife, East Sheen (gr. S. Osborn).
2. M. Biddulph, Esq.
3. J. R. Brougham, Esq., Carshalton (gr. W. Jones).

**Class 44.**—Cooking Apples, 6 dishes, distinct.

First Prize, £1 ; Second, 15s.

1. Roger Leigh, Esq.
2. H. H. Hurnard, Esq., Hingham.

**Class 45.**—Cooking Apples, 3 dishes, distinct.

First Prize, 10s. ; Second, 7s.

1. A. W. G. Wright, Esq., Newent (gr. W. H. Davies).
2. M. Biddulph, Esq.

**Class 46.**—Dessert Apples, 6 dishes, distinct.

First Prize, £1 ; Second, 15s.

1. Roger Leigh, Esq.
2. W. J. Startup, Esq., Maidstone (gr. T. Neale).

Class 47.—Dessert Apples, 3 dishes, distinct.

First Prize, 10s. ; Second, 7s.

1. Capt. Carstairs, Newbury (gr. C. Ross).
2. F. W. Buxton, Esq., Sawbridgeworth (gr. W. H. Godden).

Class 48.—Dessert Pears, 18 dishes, distinct.

First Prize, £3. 10s. ; Second, £2.

1. Roger Leigh, Esq.
2. Sir Marcus Samuel, Maidstone (gr. W. H. Bacon).

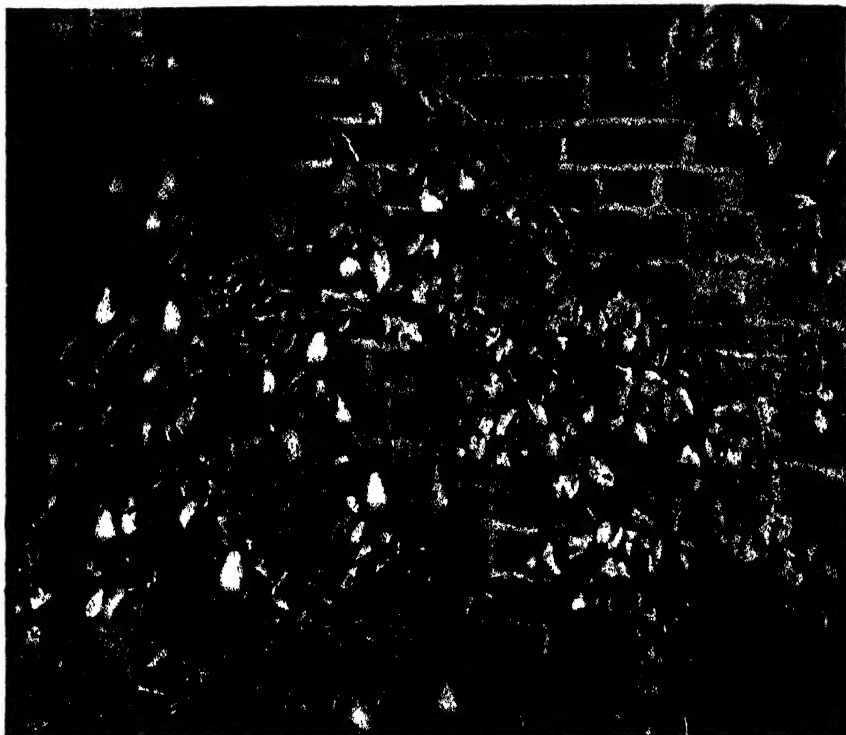


FIG. 117.—CORDON PEARS. (*The Garden.*)

Class 49. —Dessert Pears, 12 dishes, distinct.

First Prize, £2 ; Second, £1. 10s.

1. Duke of Fife.
2. Col. H. Walpole.

Class 50.—Dessert Pears, 9 dishes, distinct.

First Prize, £1. 10s. ; Second, £1.

1. J. R. Brougham, Esq.
2. H. Partridge, Esq., Bletchingley (gr. J. W. Barks).

Class 51.—Dessert Pears, 6 dishes, distinct.

First Prize, £1 ; Second, 15s.

1. The Marquis Camden, Lamberhurst (gr. G. H. Sage).
2. H. Padwick, Esq., Horsham (gr. J. Webb).

**Class 52.**—Dessert Pears, 3 dishes, distinct.

First Prize, 15s. ; Second, 10s.

1. G. H. Hadfield, Esq., Ross (gr. J. Rick).
2. Earl of Ashburnham, Battle (gr. G. Grigg).

**Class 53.**—Cooking Pears, 3 dishes, distinct.

First Prize, 15s. ; Second, 10s.

1. Sir M. W. Collet, Bart.
2. Roger Leigh, Esq.

**Class 54.**—Peaches, grown entirely out of doors, 3 dishes, distinct.

First Prize, £1. 10s. ; Second, £1.

1. Roger Leigh, Esq.
2. Col. H. Walpole.

**Class 55.**—Peaches, grown entirely out of doors, 1 dish of one variety.

First Prize, 10s. ; Second, 7s.

1. J. W. Fleming, Esq.
2. Earl of Stanhope, Sevenoaks (gr. C. Sutton).

**Class 56.**—Nectarines, grown entirely out of doors, 3 dishes, distinct.

First Prize, £1. 10s. ; Second, £1.

1. Roger Leigh, Esq.
2. O. F. Avigdor-Goldsimid, Esq.

**Class 57.**—Nectarines, grown entirely out of doors, 1 dish of one variety.

First Prize, 10s. ; Second, 7s.

1. H. A. Attenborough, Esq., Daventry (gr. A. Child).
2. R. Bedingfeld, Esq., Roehampton (gr. J. Sparks).

**Class 58.**—Plums, 4 dishes of Dessert, distinct.

First Prize, £1 ; Second, 15s.

1. Lord Braybrooke.
2. Earl of Harrington.

**Class 59.**—Plums, 1 dish of Dessert, of one variety. Not Gages.

First Prize, 7s. ; Second, 5s.

1. G. H. Hadfield, Esq.
2. J. Wingfield Digby, Esq., Sherborne (gr. T. Turton).

**Class 60.**—Gage Plums, 1 dish.

First Prize, 7s. ; Second, 5s.

1. F. M. Lonergan, Esq., Reading (gr. R. Chamberlain).
2. Col. H. Walpole.

**Class 61.**—Plums, 4 dishes of Cooking, distinct.

First Prize, £1 ; Second, 15s.

1. Earl of Carnarvon, Newbury (gr. W. Pope).
2. Earl of Ashburnham.

**Class 62.**—Plums, 1 dish of Cooking of one variety.

First Prize, 7s.; Second, 5s.

1. Col. H. Walpole.
2. J. Wingfield Digby, Esq.

**Class 63.**—Collection of Raspberries, Blackberries, Loganberries, and other kindred Berries, distinct, 1 lb. of each.

First Prize, 15s.; Second, 10s.

No entries.

## DIVISION V.

### *Special District County Prizes.*

Open to Gardeners and Amateurs only.

(In this Division all fruit must have been grown in the open.)

N.B.—Exhibitors in Division V. must not compete in Divisions II. and III., or in Classes 1, 2, 3, 4, 41, 42, 43, 46, 48, 49, 50.

**Class AA.**—Apples, 6 dishes, distinct, 4 Cooking, 2 Dessert.

1st Prize, £1 and 3rd class Single Fare from Exhibitor's nearest railway station to London; 2nd Prize, 15s. and Railway Fare as above.

**Class BB.**—Dessert Pears, 6 dishes, distinct.

1st Prize, £1. 10s. and Railway Fare as above; 2nd Prize, £1 and Railway Fare as above.

The two above Classes Nos. AA and BB are repeated ten times as follows; and Exhibitors must enter for them thus: "Class AA 64" or "BB 65," and so on, to make it quite clear whether they mean Apples or Pears.

**Class 64.**—Open only to Kent Growers.

- |             |   |   |
|-------------|---|---|
| AA.—Apples. | { | 1. G. H. Dean, Esq., Sittingbourne (gr. W. T. Stowers). |
|             | { | 2. South-Eastern Agricultural College, Wye.             |
| BB.—Pears.  | { | 1. G. H. Dean, Esq.                                     |
|             | { | 2. T. L. Boyd, Esq.                                     |

**Class 65.**—Open only to Growers in Surrey, Sussex, Hants, Dorset, Somerset, Devon, and Cornwall.

- |             |   |                             |
|-------------|---|-----------------------------|
| AA.—Apples. | { | 1. J. Wingfield Digby, Esq. |
|             | { | 2. Earl of Ashburnham.      |
| BB.—Pears.  | { | 1. F. W. Thomas, Esq.       |
|             | { | 2. Earl of Ashburnham.      |

**Class 66.**—Open only to Growers in Wilts, Gloucester, Oxford, Bucks, Berks, Beds, Herts, and Middlesex.

- |             |   |  |
|-------------|---|--|
| AA.—Apples. | { | 1. A. W. G. Wright, Esq.   |
|             | { | 2. Alfred de Rothschild, Esq.  |
| BB.—Pears.  | { | 1. H. St. Vincent Ames, Esq., Westbury-on-Trym<br>(gr. W. H. Bannister). |
|             | { | 2. Lord Hillingdon.  |

**Class 67.**—Open only to Growers in Essex, Suffolk, Norfolk, Cambridge, Hunts, and Rutland.

- AA.—Apples. { 1. H. H. Hurnard, Esq.  
2. No award.
- BB.—Pears. { 1. Lord Suffield.  
2. Col. Archer Houblon, Bishop Stortford (gr. W. Harrison).

**Class 68.**—Open only to Growers in Lincoln, Northampton, Warwick, Leicester, Notts, Derby, Staffs, Shropshire, and Cheshire.

- AA.—Apples. { 1. Duke of Rutland, Grantham (gr. W. H. Divers).  
2. Henry Knott, Esq., Stamford (gr. J. Naylor).
- BB.—Pears. { 1. Duke of Portland, Worksop (gr. J. Roberts).  
2. Duke of Rutland.

**Class 69.**—Open only to Growers in Worcester, Hereford, Monmouth, Glamorgan, Carmarthen, and Pembroke.

- AA.—Apples. { 1. G. H. Hadfield, Esq.  
2. R. M. Whiting, Esq., Hereford.
- BB.—Pears. { 1. G. H. Hadfield, Esq.  
2. No award.

**Class 70.**—Open only to Growers in the other Counties of Wales.

- AA.—Apples. { 1. R. D. Hughes, Esq., Denbigh.  
2. Dowager Lady Williams Wynn, Oswestry (gr. G. J. Squibbs).
- BB.—Pears. { 1. Dowager Lady Williams Wynn.  
2. No award.

**Class 71.**—Open only to Growers in the six northern Counties of England, and in the Isle of Man.

- AA.—Apples. { 1. Mr. J. Garside, Garstang.  
2. No award.
- BB.—Pears. No entries.

**Class 72.**—Open only to Growers in Scotland.

- AA.—Apples. { 1. Earl of Galloway, Garliestown (gr. J. Day).  
2. Earl of Home, Coldstream (gr. J. Cairns).
- BB.—Pears. { 1. Earl of Galloway.  
2. Earl of Home.

**Class 73.**—Open only to Growers in Ireland.  
No entries.

**Class 74.**—Open only to Growers in the Channel Islands.

- AA.—Apples.
- BB.—Pears. 1. Mr. H. G. Howell, Jersey.

DIVISION VI.

*Single Dishes of Fruit grown in the Open Air.*

Open to Gardeners and Amateurs only. Nurserymen and Market Growers excluded.

Prizes in each Class (except 105, 118, and 127), 1st, 7s.; 2nd, 5s.

DESSERT APPLES.

Class 75.—Adams's Pearmain.

1. Roger Leigh, Esq.
2. H. H. Williams, Esq., Truro.

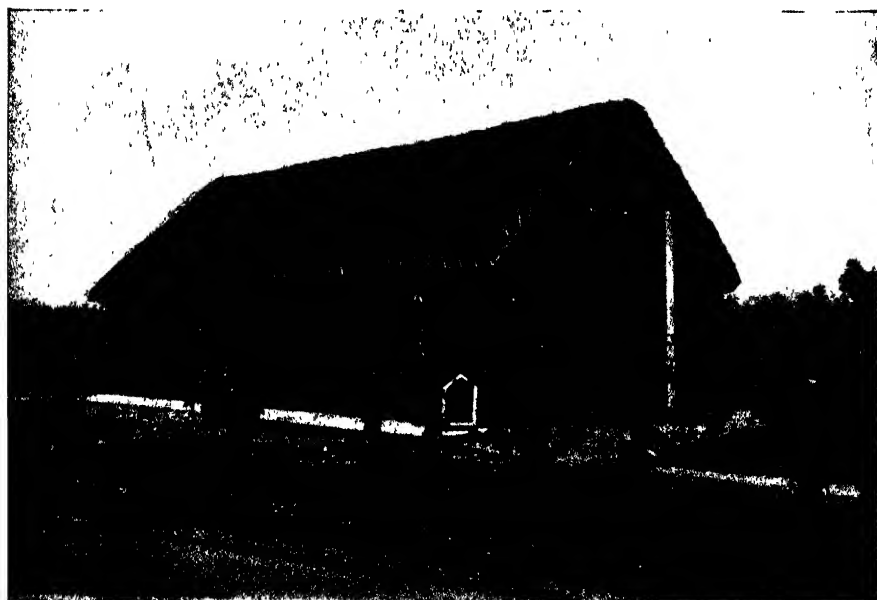


FIG. 118.—MESSRS. J. VEITCH'S FRUIT ROOM AT LANGLEY. (*The Garden.*)

Class 76.—Allen's Everlasting.

1. Roger Leigh, Esq.
2. No award.

Class 77.—Allington Pippin.

1. L. H. Page, Esq., Sittingbourne (gr. J. S. Perkiss).
2. Captain Carstairs.

Class 78.—Blenheim Orange.

Small highly coloured Fruits which will pass through a 3-inch ring.

1. A. W. G. Wright, Esq.
2. W. J. Startup, Esq.

Class 79.—Braddick's Nonpareil.

1. Surgeon-General Charles Planck, Edenbridge (gr. J. Treadwell).
2. Roger Leigh, Esq.

**Class 80.**—Brownlee's Russet.

1. T. L. Boyd, Esq.
2. Roger Leigh, Esq.

**Class 81.** Claygate Pearmain.

1. Roger Leigh, Esq.
2. G. H. Bird, Esq., West Wickham (gr. H. Redden).

**Class 82.**—Cockle's Pippin.

1. A. J. Carter, Esq., Billingshurst.
2. No award.

**Class 83.**—Cox's Orange Pippin.

1. Roger Leigh, Esq.
2. Jeremiah Colman, Esq., Reigate (gr. W. P. Bound).

**Class 84.**—D'Arcy Spice, *syn.* Baddow Pippin.

1. H. H. Williams, Esq.
2. No award.

**Class 85.**—Duke of Devonshire.

1. J. R. Brougham, Esq., Carshalton (gr. W. Jones).
2. F. M. Loneragan, Esq.

**Class 86.**—Egremont Russet.

1. R. M. Whiting, Esq.
2. O. E. Avigdor-Goldsmid, Esq.

**Class 87.**—Fearn's Pippin.

1. G. H. Dean, Esq.
2. H. St. Vincent Ames, Esq.

**Class 88.**—Gascoigne's Scarlet.

Small highly coloured Fruits which will pass through a 3-inch ring.

1. G. H. Dean, Esq.
2. T. Clinch, Esq., Sittingbourne.

**Class 89.**—Golden Reinette.

1. J. R. Brougham, Esq.
2. A. Pears, Esq., Isleworth (gr. W. Farr).

**Class 90.**—Gravenstein.

1. Colonel H. Walpole.
2. A. H. Smee, Esq., Hackbridge (gr. W. E. Humphreys).

**Class 91.**—James Grieve.

1. Capt. Carstairs.
2. O. E. Avigdor-Goldsmid, Esq.

**Class 92.**—King of the Pippins.

1. Mrs. Walter Scott, Weybridge (gr. C. W. Baynes).
2. W. J. Startup, Esq.

Class 93.—King of Tomkins County.

1. Surgeon-General Chas. Planck.
2. Duke of Fife.

Class 94.—Lord Burghley.

1. Col. H. Walpole.
2. Sir M. W. Collet, Bart.

Class 95.—Lord Hindlip.

No award.

Class 96.—Mannington's Pearmain.

1. Roger Leigh, Esq.
2. A. Pears, Esq.

Class 97.—Margil.

1. Roger Leigh, Esq.
2. J. R. Brougham, Esq.

Class 98.—Mother (American).

1. Madame Stewart, Roehampton (gr. A. Smith).
2. C. R. Scrase Dickens, Esq.

Class 99.—Ribston Pippin.

1. G. H. Dean, Esq.
2. Lord Poltimore, Exeter (gr. T. H. Slade).

Class 100.—Rosemary Russet.

1. F. M. Loneragan, Esq.
2. R. M. Whiting, Esq.

Class 101.—Ross Nonpareil.

1. The Marquis Camden.
2. No entry.

Class 102.—Scarlet Nonpareil.

1. Leopold de Rothschild, Esq.
2. Roger Leigh, Esq.

Class 103.—Sturmer Pippin.

1. J. C. Daubuz, Esq., Truro.
2. G. H. Dean, Esq.

Class 104.—Washington.

1. Roger Leigh, Esq.
2. Earl of Ashburnham.

Class 105.—Winter Quarrenden.

First Prize, 20s. ; Second, 10s. ; Third, 5s.

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open only to Exhibitors living in Cardigan, Badnor, Shropshire, Stafford, Warwick, Northampton, Bedford, Cambridge, Essex, or Counties further north.

No entry.

**Class 105a.**—Winter Quarrenden.

First Prize, 20s. ; Second, 10s. ; Third, 5s.

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open only to Exhibitors living south of the above-named Counties.

1. No award.
2. F. W. Thomas, Esq.
3. No award.

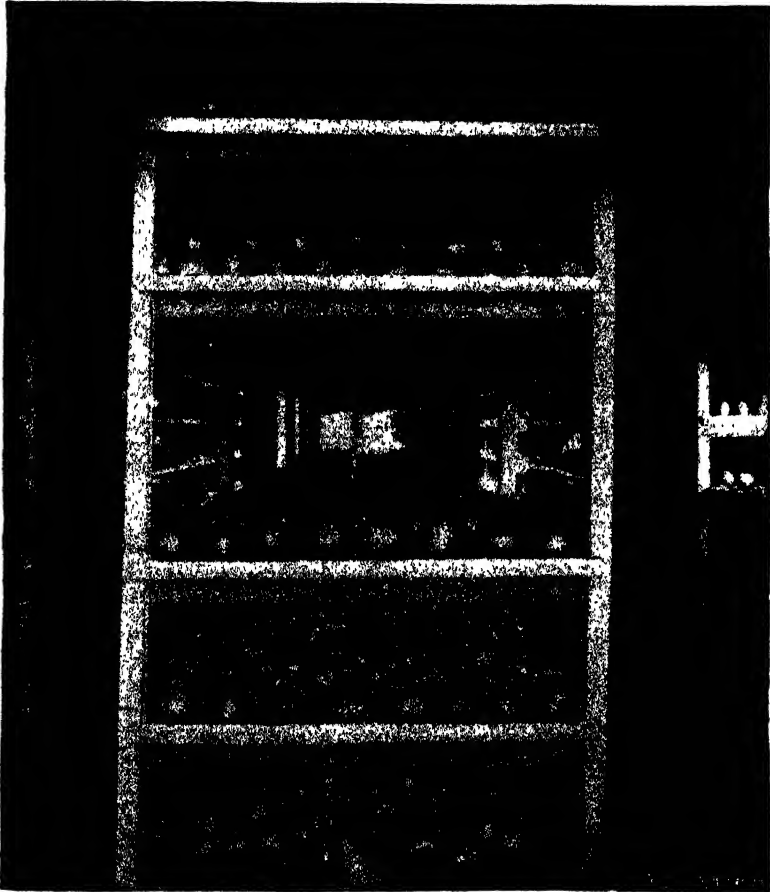


FIG. 119.—INTERIOR OF MR. BUNYARD'S FRUIT ROOM AT MAIDSTONE.  
(*The Garden.*)

**Class 106.**—Worcester Pearmain.

1. A. W. G. Wright, Esq.
2. G. H. Dean, Esq.

**Class 107.**—Any other Variety.

An Exhibitor may only enter one variety in Class 107.

1. Roger Leigh, Esq.
2. F. W. Buxton, Esq.

## COOKING APPLES.

Class 108.—Alfriston.

1. Roger Leigh, Esq.
2. Madame Stewart.

Class 109.—Beauty of Kent.

1. Roger Leigh, Esq.
2. W. J. Startup, Esq.

Class 110.—Belle de Pontoise.

1. Roger Leigh, Esq.
2. Col. H. Walpole.

Class 111.—Bismarck.

1. Roger Leigh, Esq.
2. Madame Stewart.

Class 112.—Blenheim Orange. Large Fruits.

1. W. J. Startup, Esq.
2. F. W. Buxton, Esq.

Class 113.—Bramley's Seedling.

First Prize, 20s. ; Second, 10s. ; Third, 5s.

Prizes given by Messrs. H. Merryweather, The Nurseries, Southwell.

1. R. M. Whiting, Esq.
2. Roger Leigh, Esq.
3. G. H. Dean, Esq.

Class 114.—Cellini.

1. Lord Poltimore.
2. G. H. Bird, Esq.

Class 115.—Cox's Pomona.

1. G. H. Dean, Esq.
2. Col. H. Walpole.

Class 116.—Dumelow's Seedling, *syn.* Wellington and Normanton Wonder.

1. Madame Stewart.
2. Earl of Ashburnham.

Class 117.—Emperor Alexander.

1. Roger Leigh, Esq.
2. G. H. Dean, Esq.

Class 118.—Gascoigne's Scarlet. Large Fruits.

1. G. H. Dean, Esq.
2. H. H. Williams, Esq.

Class 119.—Golden Noble.

1. Sir M. W. Collet, Bart.
2. Roger Leigh, Esq.

**Class 120.**—Golden Spire.

1. Roger Leigh, Esq.
2. R. M. Whiting, Esq.

**Class 121.**—Grenadier.

1. Roger Leigh, Esq.
2. A. W. G. Wright, Esq.

**Class 122.**—Hormead Pearmain.

1. R. M. Whiting, Esq.
2. G. H. Hadfield, Esq.

**Class 123.**—Lane's Prince Albert.

1. Capt. Carstairs.
2. G. H. Dean, Esq.

**Class 124.**—Lord Derby.

1. G. H. Dean, Esq.
2. Roger Leigh, Esq.

**Class 125.**—Lord Suffield.

1. Roger Leigh, Esq.
2. G. H. Dean, Esq.

**Class 126.**—Mère de Ménage.

1. Roger Leigh, Esq.
2. G. H. Dean, Esq.

**Class 127.**—Newton Wonder. Fig. 120.

First Prize, 20s.; Second, 10s.; Third, 5s.

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open only to Exhibitors living in Cardigan, Radnor, Shropshire, Stafford, Warwick, Northampton, Bedford, Cambridge, Essex, or Counties further north.

1. H. H. Hurnard, Esq.
2. Duke of Rutland.
3. No award.

**Class 127a.**—Newton Wonder.

Open only to Exhibitors living south of the before-named Counties.

- |                                |          |
|--------------------------------|----------|
| 1. F. W. Thomas, Esq.          | } equal. |
| 2. Leopold de Rothschild, Esq. |          |
| 2. Roger Leigh, Esq.           |          |

**Class 128.**—Peasgood's Nonesuch.

1. Roger Leigh, Esq.
2. G. H. Dean, Esq.

**Class 129.**—Potts's Seedling.

1. A. W. G. Wright, Esq.
2. Roger Leigh, Esq.

Class 130.—Royal Jubilee.

1. Capt. Carstairs.
2. Roger Leigh, Esq.



FIG. 120. —BUSH APPLE TREE, NEWTON WONDER. (*The Garden.*)

Class 131.—Sandringham.

1. Madame Stewart.
2. Roger Leigh, Esq.

Class 132.—Stirling Castle. Fig. 121.

1. Roger Leigh, Esq.
2. R. M. Whiting, Esq.

**Class 133.**—Stone's (*syn.* Loddington Seedling).

1. Roger Leigh, Esq.
2. Earl of Stanhope.

**Class 134.**—The Queen.

1. Roger Leigh, Esq.
2. Alfred de Rothschild, Esq.

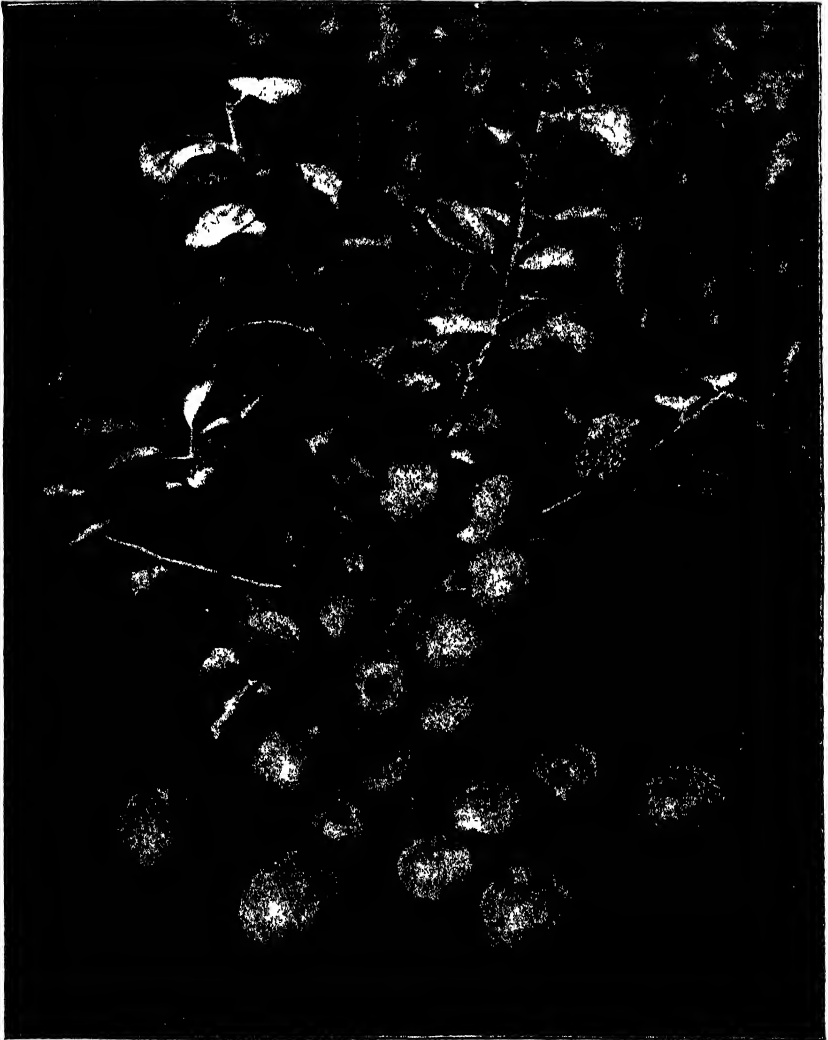


FIG. 121.—APPLE, STIRLING CASTLE. (*Journal of Horticulture.*)

**Class 135.**—Tower of Glamis.

1. Roger Leigh, Esq.
2. Earl of Stanhope.

**Class 136.**—Twenty Ounce.

1. Roger Leigh, Esq.
- No other entry.

**Class 137.**—Waltham Abbey Seedling.

1. Roger Leigh, Esq.
2. T. Clinch, Esq.

**Class 138.**—Warner's King.

1. G. H. Dean, Esq.
2. A. W. G. Wright, Esq.

**Class 139.**—Any other variety.

An Exhibitor may only enter one variety in Class 139

1. Roger Leigh, Esq.
2. Earl of Harrington.

## DESSERT PEARS.

**Class 140.**—Beurré Baltet Père.

1. Roger Leigh, Esq.
2. No award.

**Class 141.**—Beurré Bosc.

1. Hon. P. C. Glyn, Godstone (gr. J. Friend).
2. H. Padwick, Esq.

**Class 142.**—Beurré d'Anjou.

1. The Marquis Camden.
2. F. M. Loneragan, Esq.

**Class 143.**—Beurré Diel.

1. Lord Suffield.
2. J. Wingfield Digby, Esq.

**Class 144.**—Beurré Dumont.

1. Roger Leigh, Esq.
2. Surgeon-General C. Planck.

**Class 145.**—Beurré Fouquieray.

1. Marquis Camden.
2. F. W. Thomas, Esq.

**Class 146.**—Beurré Hardy.

1. Roger Leigh, Esq.
2. G. H. Dean, Esq.

**Class 147.**—Beurré Mortillet.

1. F. W. Thomas, Esq.

**Class 148.**—Beurré Superfin.

1. F. W. Thomas, Esq.
2. G. H. Dean, Esq.

**Class 149.**—Comte de Lamy.

1. O. A. Smith, Esq., East Grinstead (gr. C. Harris).
2. Lord Suffield.

**Class 150.**—Conference.

1. Roger Leigh, Esq.
2. H. Partridge, Esq.

**Class 151.**—Doyenné du Comice.

1. Roger Leigh, Esq.
2. Col. Archer Houblon.

**Class 152.**—Duchesse de Bordeaux.

1. T. L. Boyd, Esq.
2. Marquis Camden.

**Class 153.**—Durondeau.

1. J. Wingfield Digby, Esq.
2. Roger Leigh, Esq.

**Class 154.**—Emile d'Heyst.

1. Roger Leigh, Esq.
2. Lord Suffield.

**Class 155.**—Fondante d'Automne.

1. J. R. Brougham, Esq.
2. Lord Suffield.

**Class 156.**—Fondante de Thirriott.

1. Roger Leigh, Esq.
2. Marquis Camden.

**Class 157.**—Glou Morceau.

1. Roger Leigh, Esq.
2. J. R. Brougham, Esq.

**Class 158.**—Joséphine de Malines.

1. Roger Leigh, Esq.
2. Captain Carstairs.

**Class 159.**—Louise Bonne of Jersey.

1. Lord Poltimore.
2. A. Pears, Esq.

**Class 160.**—Marie Benoist.

1. F. W. Buxton, Esq.
2. Roger Leigh, Esq.

**Class 161.**—Marie Louise.

1. Lord Suffield.
2. R. Morse, Esq., Babington, Bath.

**Class 162.**—Marguerite Marillat.

1. Roger Leigh, Esq.
2. F. W. Thomas, Esq.

**Class 163.**—Nouvelle Fulvie.

1. Lord Braybrooke.
2. Roger Leigh, Esq.

**Class 164.**—Pitmaston Duchess.

1. Earl of Ashburnham.
2. Roger Leigh, Esq.

**Class 165.**—Seckle.

1. Captain Carstairs.
2. Col. H. Walpole.

**Class 166.**—Souvenir du Congrès.

1. G. H. Hadfield, Esq.
2. F. W. Thomas, Esq.

**Class 167.**—Thompson's.

1. Lord Suffield.
2. Lord Hillingdon.

**Class 168.**—Triomphe de Vienne.

1. Lord Poltimore.
2. Alfred de Rothschild, Esq.

**Class 169.**—Winter Nelis.

1. H. Padwick, Esq.
2. Roger Leigh, Esq.

**Class 170.**—Any other variety.

An Exhibitor may only enter one variety in Class 170.

1. Roger Leigh, Esq.
2. Earl Stanhope.

## OTHER EXHIBITS.

Outside the Schedule there were numerous beautiful collections of Flowers, but the Show being essentially a Fruit Show these can receive less notice than they deserve.

By far the most interesting thing to fruit growers was a collection of Apples, shown by the Principal (A. D. Hall, Esq.) of the South-Eastern Agricultural College at Wye, in Kent, to illustrate by actual experiment the effect of Manures on Apples. In the year 1897 five precisely similar two-year-old trees of 'Bismarck' Apple worked on Paradise stock were planted in large tubs in light chalky loam and plunged in the open ground. All received exactly the same treatment in every respect except the manure, of which each tub received a different mixture, but each individual tub received the same mixture repeated in 1898, 1899, and 1900. After the fruit had all set and pipped, each plant was thinned until they all carried exactly the same number of fruits (a

few were afterwards blown off by the wind), and the whole 1900 crop off each tree was exhibited, with the following results :—

No. 1. No manure. Crop, 26 fruits averaging a little under 4 ounces each.

No. 2. A complete artificial manure containing nitrogen, phosphate, and potash. Crop, 20 fruits averaging  $4\frac{1}{2}$  ounces each.

No. 3. Nitrogen and potash as No. 2, but no phosphate. Crop, 21 fruits averaging  $4\frac{1}{4}$  ounces each.

No. 4. Nitrogen and potash as Nos. 2 and 3, and three times as much phosphate as No. 2. Crop, 25 fruits averaging  $7\frac{1}{2}$  ounces each.

No. 5. Same as No. 2 with some iron added. Crop, 18 fruits averaging 4 ounces. It was very interesting to note that the presence of iron

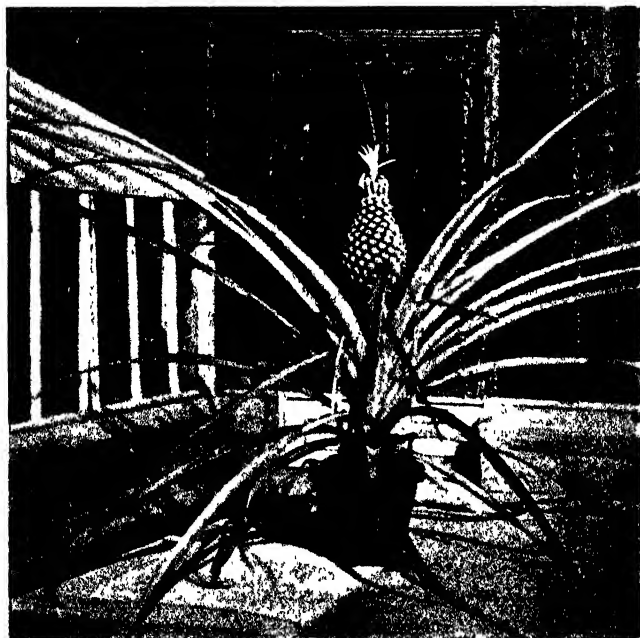


FIG. 122.—A FINE PINEAPPLE. (*The Garden.*)

had not heightened the colour in any way, and that the most highly coloured apples of the series were on No. 1, the unmanured tree.

The trees will doubtless get a little more into line as the experiment becomes older and the effect of the original soil and wood gives way to the manures and the new wood grown under their influence. Still, if they are put in this order :—

1. No manure, 4 ounces ;

3. Nitrogen and potash,  $4\frac{1}{4}$  ounces ;

2. Nitrogen, potash, and phosphate,  $4\frac{1}{2}$  ounces ;

4. Nitrogen, potash, and 3 phosphate,  $7\frac{1}{2}$  ounces,

the effect of the phosphate is evident. Why the phosphate in No. 2 did not bring up the weight more is not quite clear, but presumably the extra two parts of phosphate was necessary to do this.

An exhibit which attracted universal attention was a monster Pine-apple, sent from his gardens at Hohe Warte, Vienna, by Baron Nathaniel de Rothschild (gr. Mr. J. Roberts). It was of a brilliant, but distinctly yellow, orange-red colour, and most ornamental. Pine growers generally pride themselves on their fruits having a fine crown, but this one rejoiced in a very small head and a very big name—*Ananas Bracomorensis*. It is a native of Brazil, and the specimen shown weighed 13 pounds. Fig. 122.

The Royal Horticultural Society of Jersey sent a very fine and interesting collection of hardy fruits contributed by the members of the Society. The Melons grown out of doors and the size of the Pears made English and Scotch gardeners very envious of the soil and climate of Jersey.

Messrs. Cheal, of Crawley, had a very prettily arranged display of Dahlias intermingled with pyramids of Apples and Pears.

Messrs. Veitch, of Chelsea, set up two very interesting and really remarkable collections of small ornamental Conifers in pots, together with variegated Hollies and Ivies, the whole of which deserved a day's study.

The Cannas sent by Messrs. Cannell, of Swanley, were so striking and gorgeous that they must form an exception to the non-mention of flowers at a fruit show.

Messrs. Russell, of Richmond, again sent their collection of charming little specimen Tree-Ivies in pots.



## FIGS IN POTS.

By Mr. JAMES HUDSON, V.M.H.

[Read October 9, 1900.]

*Introductory.*—The culture of Figs in pots is not a new idea; the system, however, is well worthy of greater extension. It has much to recommend it as contrasted with the planting-out method, more especially for early and late forcing. Pot culture is conducive to fertility in a marked degree, as compared with trees that have an almost unlimited extent of border for root action. True, trees that are confined within limited borders are on the whole quite satisfactory, it takes longer, however, to bring a trained tree into a fruiting state than it does a pot-grown example. The vigour of Figs, when not restricted, or only partially so, at the roots, is well known. By adopting the pot system this is greatly modified and altered, so much so in fact as to render some varieties almost unrecognisable by their growth. Larger fruits are, as a matter of course, produced upon planted-out trees, but I have yet to learn that these are always the best. Quantity and quality combined can be obtained from those grown in pots, whilst there is not the same probability of an excess at any one time and scarcity at another.

If the culture of Figs in pots be adopted for early and late forcing as well as for the main crop, it will be found to answer admirably. By this method the glass given up to trained trees upon the roof will be at liberty. If the house or houses be lean-tos or three-quarter spans, the back wall can be covered with trained trees and the rest of the space devoted to trees in pots. The dense shade produced by Figs-next-the-glass precludes any profitable use being derived from the rest of the house. That Figs can, in general, be successfully grown in pots has been proved at Chiswick, where no such results as are now obtained could be secured if the space at disposal were given up to trained trees rather than bushes as at present. The Chiswick collection of Figs has done more, in my opinion, than anything else to popularise the culture of the fruit in this country.

*Forcing (Early).*—I was induced to adopt the pot culture of Figs in order to prolong the season. First, by early forcing, so as to have ripe fruits early in March; and secondly, by retarding the late kinds, in order to extend the season of ripening in the autumn and into December. It is thus possible to have ripe Figs for nine months in the year, trained or planted-out trees taking the mid-season. For first early forcing the best variety is without any question, in my experience, the Fig known as St. John, which for all practical purposes is identical with Pingo-de-Mel; where the one is grown the other is not required. The value of these Figs lies in the certainty with which they carry their first crop, or, in other words, the crop upon the wood of the previous year. This is a decided advantage and a great point in the gaining of time. On the other hand

the second crop is not nearly so good, but taking into consideration the value of the first crop, the one following is not of so great an importance. The St. John Fig is an excellent example of the advantages derived from pot culture *versus* the planting-out system. It is, when not restricted at the roots, an extra strong grower, so much so as to prejudice its reputation for being a good cropper. In pots it bears most abundant crops, which require thinning in order to secure fruits of good size. Brown Turkey and White Marseilles are capital varieties for succession. Our plan is to start the first early batch of St. John or Pingo-de-Mel about October 20, or at the latest by November 1. These will ripen their fruits from the middle to the end of February. Later batches continue the succession until about the end of April, when trained trees can be had in good bearing. No variation is made in respect to temperatures from what obtains in other systems of forcing the Fig. Bottom heat is supplied by means of leaves; no manure is added to the leaves for fear of an excess of heat. The bottom heat ranges from 70°, 75° to 80°; being maintained, if need be, by hot-water pipes. The moisture arising from the leaves dispenses to a considerable degree with a liberal use of the syringe; it is not well to allow the young foliage to remain wet at night, otherwise it will become too flaccid during the dull and often sunless weather of the winter season. The night temperature at the time of starting is about 50°, rising 10° and 15° during the day; this will suffice until the young foliage and fruits are well advanced. A steady increase is given, but not beyond 65° at night, until the fruits are swelling for the final stage; then another increase is given—say, 68° to 70°. A corresponding increase by day follows, as a matter of course. The syringe should again be used cautiously when the fruits are ripening, especially in the case of St. John, which has a thin skin. When the wood is well ripened and no more fruits are forthcoming the early forced bushes are taken out of doors after a gradual hardening off, or, if too early for full exposure, are removed to a cooler house. These early ones are safe out of doors in June, a sunny position being finally the best for them. The roots will frequently have extended beyond the pots into the leaves, but the check given to the plants will not be of any particular moment.

*Late Forcing.*—The treatment accorded in this instance varies somewhat from that given to the early forced lot. These are kept cool, so as to retard the growth as much as possible. By the end of March or early in April there will be signs of returning vitality, when a portion of the stock should be placed under more favourable conditions as regards growth—a late vinery for instance just closed, or any other house where somewhat similar conditions prevail. It is not desirable to excite the growth too much thus early, nor until room can be found to accommodate the plants. Cold pits or frames even will answer for some little time. Our plan is to work the various batches of late Figs through the orchard-houses as the forced trees go outside, or through the strawberry-houses meanwhile. For some weeks, however, it is possible to keep them in cold pits with just sufficient protection to keep off frost. A free growth is encouraged during the season by closing early and by generous atmospheric conditions, more moisture being given to these than to the early forced stock. It is essential to avoid a starved or stunted growth,

some of the best and certainly the most useful fruits being taken from the young wood. Overcrowding in every instance should be studiously avoided, there should always be a free play of air between the plants. The shoots are kept pinched at the fourth or fifth joint; this applies equally to all of the stock, whether early or late. Some varieties do not make shoots of any great length under pot treatment, remaining more sturdy and compact in habit. Some again may not show for fruit so readily as others upon the young wood. These may be forced into pushing forth their fruit by rubbing out the young points of growth as they successively appear. Some varieties also differ in their tendency to split when the fruit is ripening. For instance, Negro Largo rarely ever splits a fruit; hence this and similar varieties will always bear more atmospheric moisture at that stage than will Nebian or Violette Sepor, both of which are fine Figs. When the tendency to split becomes at all serious our plan is to sever the fruit partially at the stem, rather than keep the plant too dry and thus cripple the later fruits. During the summer no fire heat is needed for the late Figs, except when it is dull or rather chilly in the morning, as it was, for instance, for a time in August of this year. Unless it be quite warm it is best to employ fire heat onwards from the beginning of September, in a moderate degree at least. What has to be aimed at is to avoid a check such as will cause the foliage to fall prematurely. When this occurs the fruits, as a matter of course, suffer also. If kept too dry at the roots, if attacked by insect pests, or if a chill supervenes, this will happen. As these late Figs cease to be productive they are transferred to a cooler house, such as a vinery, where with a slight warmth for a short time and ventilation they become sufficiently hardened to stand in a cool house where the frost is excluded. It is not advisable to expose them to direct frost, although a few degrees would not injure them.

*Potting.*—We treat our Figs in pots practically the same as the other fruit trees so grown, viz., repotting every season. The early forced ones should, if possible, be potted in August or early in September, leaving them still out of doors until required for starting at the end of October. The late Figs, on the other hand, are potted as they ripen off during the winter, but, as just stated, these are still left indoors. When first starting with Figs in pots I was advised not to pot annually, and that by more than one grower. We find, however, that it is beneficial to do so. It does not by any means follow that larger pots need be used. This is only done when extra vigour is indicated. By reducing the balls it is nearly always possible to keep to the same size of pot for at least two or three seasons. If potted into larger sizes too frequently, they become more unwieldy, besides which there is more liability to become ultimately unhealthy at the roots. Fresh soil of the right kind supplied to the plants in this annual potting is much better than any excess of animal or artificial manure minus the potting. We pot as firmly as possible, after having carefully reduced the old ball so that the fresh soil can be worked around between the ball and the pot without any injury to the root. It is well to note that the balls are not too dry.

*Soil.*—The Fig thrives well in a calcareous loam; hence where this is not obtainable it becomes all the more necessary to add something like

old mortar rubble. This not only keeps the plant supplied with a requisite food, but also assists in keeping the soil open, or more porous. Such loam as that from Banstead in Surrey needs to have another quality added to it, such as a tough fibrous loam that will not in process of time become too close. This is our plan; to it we add old mortar or lime-rubble worked down through a half-inch sieve or something approaching it in size of mesh. Decomposed manure, such as that from a Melon bed, with an equal amount of leaf soil, makes an excellent addition. We do not add any artificial manures at this stage, but prefer to leave their application until the fruits are showing, and then even they should be sparingly used, a pinch between the finger and thumb being ample for one application. This may alternate with liquid manure made from fresh horse droppings rather than that from the cowyard. Once a week for each is ample.

*Top dressing.*—We attach considerable importance to this method of supplying additional nourishment to the plants when they have already filled their pots with roots and in time to render aid to them for fully developing their fruits. This is composed of similar soil with rather more manure added to it. In applying it, room around the stem should be left for watering, whilst it must be pressed down firmly. The roots will quickly find this out and at once assimilate it.

*Watering.*—When growing Figs in pots see to it that they are well supplied with water. If allowed to become dry, so that the foliage droops, they must subsequently suffer.

*Varieties recommended for pot culture.*—The varieties that I recommend for pot culture are as follows:—For first early forcing, St. John or Pingo-de-Mel, which will fruit equally well as the late varieties in pots of corresponding size. If grown at the start in six or eight inch pots a good return may be had. Brown Turkey will be a reliable succession, but it must be started at about the same time. Then White Marseilles will follow. For the main crop repeat the two last named and add Bourjassotte Grise with Violette Sepor. For late forcing Negro Largo is one of the very best; it can be relied upon until the end of October. The next is Nebian or Grosse Verte, which is at its best during September and October. Another good late Fig is Bourjassotte Noir, which crops well and does not split its fruit. The latest Fig of all is D'Agen, which we kept last year until Christmas day; it is likewise of most delicious flavour. As a delicacy I can strongly recommend White Ischia, and I have no doubt whatever that both the Black and the Brown Ischia are equally as good. The White Ischia is a most abundant bearer and of delicious flavour; it is better grown as an autumn Fig than for early forcing. I find also that Angélique is best under similar conditions. Large Black Douro is an excellent autumn variety, somewhat flat in shape, very dark in colour, and most prolific; it is not so generally known as it deserves to be. If I were confined to six varieties I would grow St. John, Brown Turkey, Bourjassotte Grise, Negro Largo, Nebian, and D'Agen. This list includes both early and late varieties.

## NOTES ON EGYPTIAN VEGETATION.

By Mr. HARRY J. VEITCH, F.R.H.S.

*(The following Notes were read at a meeting of the Horticultural Club. They were not prepared with any intention of being published, but at the request of the Secretary of the R.H.S. they have been transmitted to him for insertion in the Society's JOURNAL. The writer did not visit Egypt with the idea of reporting on the vegetation of the country, and in these Notes are recorded only the results of his observations and enquiries extending over a period of about two months, nearly one-half of which was spent on the Nile.)*

APPROACHING Egypt, as we did, in the daytime, our first view of any vegetation was, as we were nearing Port Said, when we could perceive the heads of the Date Palm, *the tree of the country*, standing, as it were, out of the water. The land being so flat we could see these Palm tree heads long before we could see anything else, the next objects to catch the eye being the lighthouses.

Arriving in the afternoon, we remained until the next morning at Port Said, a very dirty place, but as my object is to tell you what I can about the vegetation of Egypt I will not stay to describe this and other places we saw.

Leaving by the morning train we arrived at Cairo after a journey of about eight hours, passing, during the latter part of the time, through a portion of what is known in biblical history as the land of Goshen.

The land is still evidently very fertile and also very carefully cultivated. To give one example of the immense improvement which has taken place in recent years in this part of the country, as indeed seems to have been the case in almost all the other parts we saw, I may say that an area which, early in the century, barely supported 4,000 Arabs, now supports upwards of 12,000 prosperous farmers and peasants--thanks, in a great measure, to the Fresh Water Canal, which came into existence in 1858-9. This was formed by M. de Lesseps to supply the towns on the Suez Canal with drinking water, and also to irrigate the country through which it passes. The water is taken from the Nile near Cairo.

Perhaps I may as well give here a few brief particulars as to the agricultural produce of the country before touching on the horticultural aspect.

The seasons are three.

1. The winter crops, of which the seeds are sown immediately after the subsidence of the Nile inundation. In the Upper Nile district this commences as early as the middle of October. In Central Egypt (Assiut to Cairo) early in November, and in the Delta, about the end of November.

The ground is seldom prepared in any way for sowing, the annual inundation providing a fresh supply of manure. Four months is the usual period from seed-sowing to harvest for these crops.

We saw land near the Pyramids which, we were told, had been free

from water from 40 to 50 days, on which Wheat was already 8-9 inches high, and Clover even higher, and being cut. The lower parts of this land were still too swampy for sowing.

2. The second season is from April to August, but as these crops differ from those of the first season, so some, such as Rice, take longer to mature. This latter, sown in May, is ready for harvesting in November. Cotton, again, sown in April, is not ready for gathering till even later.

3. The third season is the autumn—a comparatively short season, lasting only 70 to 80 days, but sufficiently long to yield in the Delta its harvest of Maize, which, next to Wheat, is the most important of Egyptian cereals. This season is from August to October or November.

The principal products are, amongst cereals, Wheat, Maize, and Barley, also Rice, but this is cultivated only in the Delta, and we did not see it growing. I must not omit to mention the Durra or Sorghum.

Amongst leguminous products are Broad Beans, Lentils, Lupins, Peas, and Dolichos.

Clover, Lucerne, Cotton, and Flax are the principal green crops.

Poppies we saw under cultivation, which, we were told, were for the sake of the opium, and at Alexandria we saw large quantities of Onions being shipped. We were informed that the export value of this article alone is quite £50,000 annually.

Henna (*Lawsonia inermis*) is much used for dyeing the nails, palms of the hands, and soles of the feet a brownish-red colour, a very ancient custom. Saffron also is cultivated.

Of oil-producing plants, the Castor Oil, much used in Nubia for oiling the hair and body, Rape, Mustard, and the Sesame (*Sesamum indicum*) were noticed.

The Sugar Cane is very extensively cultivated in Upper Egypt, where there are large sugar factories, but the quality of the sugar is coarse. It finds a ready market, however, in Lower Egypt and in the eastern Mediterranean ports. At the time of our visit the harvest was nearly finished. We visited one or two of the larger factories, and saw the process of sugar manufacture. Only brown sugar is obtained. An inferior variety of the Cane is eaten raw in great quantities by the natives, and it seems to be cultivated in every part of the country.

Of vegetables and fruits we met with comparatively very few, it being the wrong season of the year. On the Nile, as the water receded, we noticed Melon seeds being sown on the newly uncovered sandbanks, the Government deriving a considerable income from the letting of these lands, which have to be marked out fresh each year; the annual inundation always altering their contour more or less, and also removing the old landmarks. The channel of the river is always changing.

Turning now to the Arboricultural and Horticultural aspects. Of course, as already remarked, the tree of Egypt is the Date Palm, of which, we were told, there were more than twenty varieties. One meets with these trees everywhere. The borders of the Nile are more or less lined with them for hundreds of miles. In some parts there are veritable Date Tree orchards, each covering many acres of land. All fruit-bearing trees are taxed, the Government deriving a very considerable sum from this source. The tax is 1s. a tree.

At the time of our visit the trees were only commencing to bloom. Artificial fertilisation is very generally practised. Such is the rapidity of the growth of the leaves, that frequently all the old fronds are removed before the growing season commences, and yet in a comparatively short time the trees have fine heads again.

Oranges were of course very plentiful, both the ordinary variety and the Tangerine, and the quality was excellent. Lemons also were numerous, the fruit being much smaller than those we see in this country and very juicy. Pomegranates were not in leaf, whilst of Figs we saw an abundance of trees but no fruit.

Strawberries grown in the neighbourhood were being offered for sale in Cairo.

The principal streets of Cairo have some fine avenues of trees, that most used being the Lebbek (*Albizia Lebbek*), an evergreen leguminous tree, allied to the Acacia. It grows very rapidly, some of the trees we noticed being between sixty and seventy feet in height; their spreading heads and dense foliage making a delightful shade from the very bright and powerful sun. This tree is replacing the White Mulberry and other deciduous trees formerly planted, as well as one or two kinds of Acacias.

Other trees used for avenues are *Ficus elastica*; the Sunt (*Acacia nilotica*); the Sycamore; the Carob, or Locust tree (*Ceratonia Siliqua*); and the Tamarix.

A common hedge plant is the Orange, which is cut and pruned as we treat our Quickthorn hedges.

As regards the Gardens of Egypt, there is no doubt that the most numerous and, with a few exceptions, the prettiest are at Alexandria.

At Cairo three only need very special mention: the beautiful Garden of Prince Hussein, the uncle of the Khedive, who is evidently a thorough enthusiast;

The Garden of the Gezireh Palace Hotel;

And the Ezbekiyah Public Gardens, which were formed in 1870 under the superintendence of the famous French landscape gardener, the late M. Barillet.

Other Gardens might of course be mentioned, such as that of the Zoological Society, &c., but they did not appear to me to possess any very distinctive feature.

I was very sorry to miss the Exhibition of the Horticultural Society, which was held during my absence up the Nile. I was told that the exhibits were in many instances most interesting and creditable, and that the influence of the Society was doing much good. This may, I think, be traced in a great measure to the love of flowers of the English residents at Cairo.

About an hour's railway ride from Cairo, or perhaps fifteen miles, is the Nile Barrage, the largest weir in the world, formed to retain the water of the river for the purposes of irrigation during the dry season. Here there is a very interesting Garden under the able management of Mr. Walter Draper, a former Kewite. So pleased was I with this spot that I was glad to have the opportunity of visiting it more than once.

Reverting now to the Gardens in Cairo.

The charm of Prince Hussein's Garden lies not so much in its

arrangement—excellent as that is—as in the variety of the trees and plants it contains, and their fine growth.

It is of course impossible to enumerate all those noticed, but I may mention, amongst others which particularly struck me :

*Pandanus*, several varieties, some of them twenty to thirty feet high.

*Philodendron pertusum*.

*Ficus indica*—the Banyan tree.

*Aralias*.

*Bauhinias*.

*Strelitzia augusta*, fully thirty feet in height.

*Cycas revoluta*, in several effective groups.

*Araucaria excelsa*.

*Macrozamia*s and *Eucephalartos*, in variety.

*Livistona chinensis*, better known in many British gardens as *Latania borbonica*, very fine.

*Washingtonia filifera*, with its long thread-like appendages.

Bamboos in variety—particularly the black and yellow stemmed—were very striking.

*Phoenix canariensis*, very fine.

*Magnolia grandiflora*.

Several species of *Ficus*, including, of course, *F. elastica*, very fine.

*Musas*, &c., &c.

Amongst climbing plants, the *Beaumontia grandiflora* was beautifully in bloom.

*Bougainvillea spectabilis* was a mass of rich purple, and a variety with very bright red flowers, covering a bridge, was a very striking object. I noticed this variety occasionally elsewhere in Cairo. I was told it was difficult to increase, but that when once established it grew freely enough. Evidently it has not the robust habit of *B. spectabilis*. Its colour is, however, particularly striking and effective in the bright sunlight. The *Wistaria* and many varieties of climbing and other *Roses* were of course to be found in such a garden.

Amongst bedding plants in perfection at the time of our visit the best were *Phlox Drummondii* in various colours, *Cinerarias*, *Primulas*, *Cannas*, &c.; whilst such plants as *Lantanas* formed very ornamental hedges. Orange groves were of course numerous.

The glass-houses contained *Orchids*, *Nepenthes*, *Anthuriums*, *Crotons*, *Dracenas*, and many plants well known in our stoves; also *Ferns* and other plants required for a nobleman's establishment. All were in excellent health. A considerable space is necessarily devoted also to bringing on a succession of plants for the flower garden.

The Prince is still enlarging the ornamental portion of his grounds, and no expense is spared to get effect with as little delay as possible. Large trees of any kinds specially desired are brought from a considerable distance, and I was interested in seeing how differently these were treated from what would be the case in this country. In the case of *Ficus*, trees with stems fully 6 in. in diameter had been newly planted. They had been well watered-in and the stems bound round with straw to keep them moist, and the head had been entirely removed; the gardener assured me

that under such treatment they would be sure to root, and they would then speedily form fresh heads.

The grounds, naturally flat, had been prettily undulated, much in the French style. Summer-houses, dotted here and there, made a very pleasing variety, whilst of course artificial irrigation is very largely employed. The Prince very kindly throws his grounds open one day in the week to all visitors who have previously obtained a card of admission, as to which there is no difficulty.

The Ezbekiyah Public Garden, which is in the heart of the city, contains many fine specimens. I noticed amongst others:—

*Jacaranda mimosæfolia*; more than 30 ft. in height.

The Indian Bamboo (*B. vulgaris*) is magnificent.

The Peruvian *Schinus molle*, with its elegant foliage, 30 to 40 ft. in height, is used to form arbours. It is known as the Peruvian Mastick.

*Ficus elastica*, quite 50 ft. high, and the diameter of the spread of the branches probably as much.

Of the Banyan tree (*Ficus indica*) there are magnificent examples, with numerous long pendent roots.

The Australian *Casuarina*, both *C. stricta* and *C. glauca*.

*Eucalyptus* in variety.

*Poinceana regia*.

*Erythrina indica*.

*Araucaria excelsa*, *A. brasiliensis*, and others.

*Bougainvilleas*, *Musas*, *Pittosporums*.

*Albizzia Lebbeck*, already alluded to as the fine avenue tree of Cairo.

*Bauhinia variegata*, a grand specimen, beautifully in bloom.

*Sterculia platanifolia*; *Grevillea robusta* in tree form.

*Ficus nymphæfolia*, *F. eriothryoides* and *F. Chauvieri*.

*Oleanders*, which here attain a very large size.

Hedges of single red *Hibiscus* and a white *Justicia*.

Oranges, and of course *Roses*, in profusion; *Geraniums*, *Carnations*, &c. I may here remark that *Roses* are the most general garden flower we saw in Cairo.

The *Poinsettia pulcherrima* was still in bloom, but the flowering season was almost past. I noticed bushes with from twenty to thirty heads of bloom, which, when in perfection, must have been very striking.

Amongst the bedding plants were *Verbenas*, *Cannas*, *Antirrhinums*, *Petunias*, and *Phlox Drummondii*.

*Alternantheras* are very common, growing from 12 to 18 in. in height, and evidently perennial in such a climate. They are used frequently as edgings, much in the same manner as we use the box as an edging for walks.

I must not omit to mention that the Shirley Poppies were nicely in bloom in this garden.

The Weeping Willow is a very effective tree here, overhanging the ornamental water.

One thing which struck me was, that with the exception of the Australian *Coniferæ*, there are very few of the Pine tribe. I noticed only *Pinus halepensis*. Doubtless the climate is too hot and dry for *Coniferæ* generally, but I should imagine some of the Mexican species

which have their homes on the relatively dry plateau would thrive in Egypt.

At the Nile Barrage, the Gardens of which are very tastefully arranged, reflecting great credit on Mr. Draper, I noticed, besides many of the trees and plants already mentioned:

*Bignonia venusta* splendidly in bloom, covering a high wall.

Hedges of *Duranta* and *Hibiscus*.

*Schinus terebinthifolius*, with its beautiful red fruit.

*Buddleia madagascariensis* in full bloom.

*Tecoma stans* and *T. capensis* in bloom.

Agaves and Aloes in variety.

*Habrothamnus elegans*, with flowers of a much deeper colour than with us; and, what seemed to give Mr. Draper as much pleasure as anything, the Irish Ivy was growing nicely in the garden.

Tangerine Oranges thrive best here grafted on the Citron.

*Reinwardtia* (*Linum*) *trigynum* forms large bushes, which are very effective with their numerous bright yellow flowers.

*Cissus rotundifolia*, from Abyssinia, was pointed out as one of the rarities of the collection.

Musas and the Sugar Cane, on the other hand, were seen of course wherever a vacant space wanted filling up.

Mr. Draper also has a very considerable extent of nursery for the purpose of rearing young plants with the object of extending his ornamental planting. He has in the nursery many plants growing that are still too young to put into their permanent positions, but which must eventually add very considerably to the variety and interest of an already extensive collection.

Our visit to Alexandria was but a short one. We fortunately fell in with a cabman who spoke English. He said his name was Abraham Johnson, and on our enquiry how he got his name (he being a black), he said he had taken the second name (Johnson) "because he liked the English."

Except the Gardens, there is comparatively little to be seen at Alexandria. We visited that of the late Mr. Antoniadès, which had evidently been very richly planted. Many of the trees and plants were similar to those noted at Cairo, but I noticed also—

*Acalypha* in large bushes.

Roses in variety, including Banksian, China, and Bourbon.

*Russellia juncea* in full bloom—*Daturas*.

Bamboos, very fine.

*Pandanus utilis*.

Mulberry, black and white fruited.

*Chamærops humilis* in many beautiful varieties.

*Sabal umbraculifera*.

Oleander, pink and white, &c., &c.

An interesting sight was a very large plantation, several acres in extent, of three varieties of *Musa* (the Indian, the Egyptian, and the Red), all of them being grown for their fruit, which is exported to various parts of Europe. Dates were of course also largely cultivated. The finest suburb of Alexandria is Ramleh, where every one who can afford it has a

villa. Every house in this suburb has a garden more or less beautiful, and flowers are evidently very highly appreciated here.

The Roses were particularly beautiful at the time of our visit, also Carnations. Oranges, Palms, &c., were in profusion, and many of the same kinds of plants as I have already enumerated.

Our trip up the Nile, which we ascended for upwards of 750 miles, was extremely interesting from a sight-seeing point of view, but one began to tire of the monotony of the ever-present Date Palm after the first week or two, and that notwithstanding the fact that the further we went, the finer the trees were. As we got into Nubia we met with the celebrated Doum Palm (*Hyphæne thebaica*), which became more common the further south we went. This is a fan-leaved Palm, and I believe the only genus of Palms with a branching habit. It attains a considerable size, and sometimes the branching is repeated three or four times. Its large nuts are used for food, whilst ornaments and objects of various kinds are made from the hard rind.

The Castor Oil plant grows here to a great height, frequently 20 ft. or more, and branching. A very common tree, or large bush, is the *Acacia nilotica*, popularly known as the "Sunt."

Although the Nile vegetation was comparatively monotonous, two matters interested me very much.

1. The method of irrigation.
2. The manure used.

As both these are connected with the cultivation of crops, a few remarks may not be considered out of place.

The necessity for irrigation depends, of course, on the relative height of the soil above the Nile surface. There are many localities which retain sufficient moisture after the subsidence of the water to admit of the crops ripening without additional irrigation; but where this is necessary it is effected by one of two methods—either by means of water-wheels, called "Sakiyeh," worked usually by cattle or buffaloes, but sometimes by camels or donkeys (these wheels are 20 to 30 ft. in diameter, fitted with buckets or scoops of wood or clay, like a dredging machine); the other method being an apparatus worked by one person only. This more nearly resembles that of an ordinary well, and is called a "Shaduf," the water being raised in shallow broad buckets resembling baskets. We frequently saw three or four of these arranged one above the other where it was desired to raise the water to a considerable height. The Fellahin who work these are fine-looking men as a rule, with scarcely any covering besides a loin cloth, and some even dispensing with that garment.

*Manure.*—The chief fertiliser is of course the river itself, which brings down much soil every season. The composition of the deposit is said to consist of 18 per cent. of carbonate of lime, 9 per cent. quartz, silica, &c., 6 per cent. oxide of iron, 4 per cent. carbonate of magnesia, and the remaining 63 per cent. water and sand.

The dung of the domestic animals being used for fuel (as wood is so scarce), pigeon dung is the only manure available for agricultural purposes, and accordingly the number and size of the pigeon-houses are very great. Immense flocks of these birds are seen everywhere in the country

districts. Whether they repay the owner is another matter, seeing how much they consume.

An abundant source of manure is afforded also by the ruins of ancient towns, which were built of unbaked clay, but now consist of mounds of earth recognisable only as masses of ruins by the fragments of pottery they contain. Out of these mounds, which contain the rubbish of thousands of years, is dug a kind of earth known as "sebbakh," sometimes containing as much as 12 per cent. of saltpetre, soda, ammonia, and other salts.

One meets continually string after string of camels, which have conveyed produce into Cairo, returning laden with this manure, all carried in paniers, and the same thing is frequently observed all along the Nile banks.

*Tools.*—Those used are most primitive, consisting only of the plough and a kind of mattock or hoe.

The plough is exactly similar to that used thousands of years ago, as can be seen by the hieroglyphics in the tombs and elsewhere. It merely scratches the surface of the ground, being held by one hand whilst the other holds the goad, which is used freely but not unkindly.

In conclusion, I may say we saw no Papyrus growing wild, and we were informed it was to be found now only above Khartum. It is this which was recently cut through in that part of the river to allow of water communication with Fashoda and the districts beyond Khartum being renewed.

Nor are there any rushes growing now at the spot where Moses is said to have been hidden by his parents.

That the country has very much changed since that time none will be surprised to hear, and nothing proves this more than the petrified forests which are to be seen not far from Cairo. We visited one of these, and saw the remains of many trees. Whether these grew there originally or were floated thither is unknown. Certain it is that no living trees are now to be seen anywhere near the spot we visited, and so far as can be ascertained none corresponding to these petrified remains are now to be found. These trees do not appear to have been Palms.



## THE LAW OF SEPARATION OF CHARACTERS IN CROSSES.

By Professor HUGO DE VRIES.

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(Preliminary Communication.\*)

ACCORDING to the hypothesis of Pangenesis the character of a plant, as a whole, is composed of definite units. These so-called elements of the species, or elementary characters, are assumed to be associated with material bodies conveying them. Each single character has its special form of such material body.†

Transitional stages between these elements are as rare as those between chemical molecules.

For many years this principle has formed the starting-point of my researches. Many important consequences are deducible from this principle and can be experimentally proved. My trials have been made partly in the domain of variability‡ and mutability, and partly in that of crosses.

In this last direction, however, the point of view from which investigation starts must be entirely reversed. It is requisite that *the idea of the species as opposed to its composition of independent factors* should be left in the background.§

The present doctrine of crossing treats species, sub-species, and varieties as the units whose combinations can be effected and studied in the crosses obtained. A distinction is drawn between mixture of varieties and true hybrids between species. According to the number of the parental types we speak of diphylic and polyphylic crosses, of triple and quadruple hybrids, and so on.

This mode of regarding the subject must, to my mind, be abandoned for physiological research. It suffices for systematic and horticultural purposes, but not for a deeper knowledge of the species.

For it must be substituted the principle of the crossing of the specific characters. The units of the specific characters are to be regarded and studied as sharply separated quantities. They must be treated as independent the one from the others, in every case and so long as no reason presents itself to the contrary. In every experimental crossing, therefore, only one character or a definite number of such is to be taken into consideration; the rest can, for the time being, be ignored. Or rather is

\* The detailed description of my experiments, together with the theoretical explanation, I purpose shortly to publish in a larger work upon the empirical units of specific characters and their origin—"The Theory of Mutation" (*Die Mutations-theorie*).

† *Intracellulare Pangenesis*, pp. 60-75. For the contrary opinion, viz., that in each material-conveying body the entire character of the species is embodied, see *ibid.* pp. 47-60.

‡ *Vide* these "Berichte," vol. xii., 1894, p. 197.

§ *Intracellulare Pangenesis*, p. 25.

it immaterial whether the parents differ from one another in other respects? For experimental purposes it is clear that the crosses the two parents of which differ only in one character form the simplest cases (Monohybrids, as opposed to Di-Polyhybrids).

If the parents of a cross only vary from each other in one point, or if only one or a few of the points of difference be considered, they are in these characteristics antagonistic, but all others may be regarded either as neutral or immaterial for resulting calculations. The experimental crossing thereby becomes confined to the antagonistic characters.

My experiments have led me to formulate the two following principles:\*

1. Of the two antagonistic characters the cross always displays only one, and that one is fully developed. It is therefore in this respect indistinguishable from one of the two parents. Intermediate forms do not occur in such cases.

2. At the formation of the pollen and the egg-cells the two antagonistic characters separate themselves. In so doing they follow in the majority of cases the simple laws of probability.

These two principles in their more essential points were long since formulated by Mendel in the special case of Peas.† They have, however, lapsed into oblivion and become misinterpreted.‡ They are, according to my experiments, fully established as regards pure crosses.

The absence of intermediate forms between any two simple antagonistic characters in the cross is perhaps the best proof that such characters are really definite units.§

Innumerable examples, partly in my own experience and partly derived from literature, can be cited in proof of the correctness of these principles. That Polyhybrids so often present intermediate forms is obviously due to the fact that they have inherited some of their characters from the father and some from their mother. With Monohybrids, however, this is not possible.

Of the two antagonistic qualities, Mendel names those visible in the cross the "dominants," and those latent the "recessive."

Usually the systematically higher character is the dominant, or where the pedigree is known, the older; for instance:—

Dominant	Recessive
<i>Papaver somniferum</i> (high form)	<i>P. s. nanum</i>
<i>Antirrhinum majus</i> (red)	<i>A. m. album</i>
<i>Polemonium cœruleum</i> (blue)	<i>P. c. album</i>

and as of well-known origin, e.g.—

Dominant	Recessive	Known since
<i>Chelidonium majus</i>	<i>C. laciniatum</i>	1590
<i>Oenothera Lamarckiana</i>	<i>O. brevistylis</i>	1886
<i>Lychnis vespertina</i> (hairy)	<i>L. v. glabra</i>	1886

\* The "faux hybrides" of Millardet are entirely disregarded in this paper, but are treated of in the following one.

† Gregor Mendel, "Versuche über Pflanzenhybriden," in Transactions of the Naturforscher-Verein in Brünn, vol. iv., 1865, p. 1. This important paper has been so seldom cited that I only first heard of it after I had completed the bulk of my experiments, and deduced therefrom the principles set forth in the text.

‡ Compare W. O. Focke, *Die Pflanzenmischlinge*, p. 110.

§ *Intracellulare Pangenesis*, pp. 25, 26.

If this rule be applied by way of analogy to other cases, we shall occasionally find it to conflict with the accepted systematic arrangement, *e.g.*—

Dominant	Recessive
<i>Datura Tatula</i>	<i>D. Stramonium</i>
<i>Zea Mays</i> (naked-seeded)	<i>Z. cryptosperma</i>

With specific crosses (Polyhybrids), where the mutual ages of the parents are usually unknown, it may be possible to arrive at some conclusions in this direction through experimental crosses; with respect to the colour of the flowers for instance:—

Dominant	Recessive
<i>Lychnis diurna</i> (red)	<i>L. vespertina</i> (white)

#### *The Law of Separation of Characters in Crosses.*

In the cross the two antagonistic characters exist as associated but separate parts. In the vegetative development, as a rule, only the dominant one becomes visible. Exceptions are rare; many partial separations afford an example. Thus *Veronica longifolia* (blue)  $\times$  *V. longifolia alba* often produces, in my garden, spikes bearing flowers blue on one side and white on the other.

At the formation of the pollen grains and egg-cells the characters separate. The single pairs of antagonistic characters thereupon act independently of each other. From this separation results the law that—

The pollen grains and ovules of Monohybrids are not crosses, but belong entirely to the one or the other of the two parental types.

For Di-Polyhybrids the same law obtains with respect to each character regarded by itself.\*

By this principle it is possible to calculate the composition of the progeny, and by means of this calculation the validity of the law can be experimentally determined. In the simplest case the separation obviously takes place in equal halves, and we therefore get—

50 per cent. dom. + 50 per cent. rec. pollen grains  
50 per cent. dom. + 50 per cent. rec. egg-cells.

If we take  $d$  = dominant and  $r$  = recessive, fertilisation yields:

$$(d+r)(d+r)=d^2+2dr+r^2$$

or 25 per cent.  $d$  + 50 per cent.  $dr$  + 25 per cent.  $r$ .

The individuals  $d$  and  $d^2$  have only the dominant, and the examples  $r$  and  $r^2$  only the recessive character, while the  $dr$  obviously are crosses.

With self-fertilisation, whether isolated or in groups, the crosses of the first generation consequently yield as regards each single character—

25 per cent. examples with the paternal character.

25   "               "               "               maternal       "

50   "               "               which again are crosses.

According to the first principle the crosses have the dominant character, and we get therefore:—

75 per cent. examples with the dominant character.

25   "               "               "               recessive       "

\* The combinations occur in accordance with the calculus of Chance.

This proportion I found to be confirmed in very many experiments, e.g. :—

A, with artificial crossing.

Dominant	Recessive	Rec.	Year of Crossing
<i>Agrostemma Githago</i>	<i>nicaensis</i>	24 per cent.	1898
<i>Chelidonium majus</i>	<i>laciniatum</i>	26 „	1898
<i>Hyoscyamus niger</i>	<i>pallidus</i>	26 „	1898
<i>Lychnis diurna</i>	<i>L. vespert.</i> (white)	27 „	1892
„ <i>vespertina</i> (hairy)	<i>glabra</i>	28 „	1892
<i>Enothera Lamarckiana</i>	<i>brevistylis</i>	22 „	1898
<i>Papaver somnif.</i> Mephisto	Danebrog	28 „	1893
„ „ <i>nanum</i>			
(single)	double	24 „	1894
<i>Zea Mays</i> (starchy)	<i>saccharata</i>	25 „	1898

B, with free crossing.

Dominant	Recessive	Rec.	Year of Crossing
<i>Aster Tripolium</i>	<i>album</i>	27 per cent.	1897
<i>Chrysanthemum</i>			
<i>Roxburghi</i> (yellow)	<i>album</i>	23 „	1896
<i>Coreopsis tinctoria</i>	<i>brunnea</i>	25 „	1896
<i>Solanum nigrum</i>	<i>chlorocarpum</i>	24 „	1894
<i>Veronica longifolia</i>	<i>alba</i>	22 „	1894
<i>Viola cornuta</i>	<i>alba</i>	23 „	1899

Average of all these trials, 24·93 per cent.

The experiments covered usually some hundreds, sometimes up to 1,000 examples. With many other species I obtained confirmatory results.

The differentiation of the remaining 75 per cent. of the two groups cited is by no means so simple. It demands that a number of examples with the dominant character be fertilised with their own pollen, and that in the following year the progeny of each plant be cultivated and counted. I have made this trial in 1896 with *Papaver somniferum* Mephisto × Danebrog, and thereby obtained as the composition of the first generation of 1895 :—

Dominant (Mephisto)	24 per cent.
Crosses (with = 25 per cent. Daneb.)	51 „
Recessive (Danebrog)	25 „

This result agrees with the formula above given; or rather, from these figures the formula was originally deduced.

The dominant and the recessive characters show themselves in the progeny as constant, so far as they were isolated by the separation. The crosses, however, separate themselves again, according to the same law. They yielded in this trial on the average 77 per cent. with dominant, and 23 per cent. with recessive characters.

This relation has remained the same in the course of years. I have continued this experiment still through two further generations. The 50 per cent. crosses split up, the 25 per cent. dominants remain constant.

From the main principle of the law of separation various other consequences may be deduced, which admit of experimental proof.

For instance, if we fertilise a cross with the pollen of one of the two parents, or, *vice versa*, fertilise one of the parental types with the cross, we obtain :—

$$(d + r) d = d^2 + dr, \text{ and} \\ (d + r) r = dr + r^2$$

In the first case, therefore, some of the resulting plants are crosses, and the others are pure forms, but all display the dominant character. In the second case, some are hybrids with the dominant, and others are pure forms with the recessive character, and both in equal numbers; thus we have—

50 per cent. dominant (hybrids).

50 per cent. recessive (pure).

I found, for instance,—

		Rec.	Year of Trial.
<i>Clarkia pulchella</i>	× × white	50 per cent.	1896
<i>Ethiopia Lamarkiana</i>	× × brevistylis	55 „	1895
<i>Silene Armeria</i>	× × white	50 „	1895

The same law applies, as I have said, even when we investigate Di-hybrids, or study two pairs of antagonistic characters of Polyhybrids. I select, as example, a cross of mine in 1897, effected between the prickly *Datura Tatula* and *Datura Stramonium inermis*. According to a known rule with crossed plants, it is in this case quite immaterial which type bears the pollen and which the egg-cells. The hybrids bear blue flowers and prickly fruits. Some flowers were fertilised with their own pollen and their seed sown in September 1899. Already at the germination it was possible to tell by the colour of the stalks which were blue flowering and which were white. I found—

Blue (dominant + hybrid) 72 per cent.

White (recessive) 28 „

which was confirmed by the flowers afterwards.

As regards the fruits, there were—

Thornless among the blue, 26·8 per cent.

„ „ white, 28·0 „

Average 27·4 „

From this can be calculated for almost any case the composition of the offspring. If we, for instance, name A the one and B the other pair of antagonistic qualities, we shall have for Di-hybrids for

A	25 % dom.	50 % d × r	25 % rec.
B	6·25 d, 12·5 dr, 6·25 r.	12·5 d, 25 dr, 12·5 r.	6·25 d, 12·5 dr, 6·25 r.

There are, therefore, 6·25 per cent. of examples which are purely dominant in both respects, and precisely as many which are purely recessive in both respects, and so on.

Utilising the principle further, that the crosses display the dominant traits, we shall find the visible characters of the offspring to stand thus :

1. A dom. + B rec. . . 18·75 per cent.
2. A rec. + B dom. . . 18·75 „
3. A dom. + B dom. . . 56·25 „
4. A rec. + B rec. . . 6·25 „

As evidence of this I quote, for example, the following experiments :—*Trifolium pratense album* was crossed with *Trifolium pratense quinquefolium*; the white flowers and trifoliate leaves are, as against the antagonistic specific characters, recessive. The offspring of the cross I found to be—

	Calculation
1. Red and trifoliate, 13 per cent. . .	19 per cent.
2. White and quinquefoliate, 20 per cent. . .	19 „
3. Red and quinquefoliate, 61 per cent. . .	56 „
4. White and trifoliate, 5 per cent. . .	6 „

about 220 plants being concerned.

In similar fashion are the calculations and experiments to be made respecting Tri-Polyhybrids.

It frequently happens that by experiments in separation, simple characters are split up into several factors. For instance, the colour of the flowers is often composite, and we obtain after crossing the single factors partially separated and partially in various blends.

I have effected such splitting up in *Antirrhinum majus*, *Silene Armeria*, and *Brunella vulgaris*, and by so doing found the above numerical proportions confirmed. For instance, the red *Antirrhinum majus* crossed with the white splits up into these two and into yellow with red (Brilliant) and white with red (Delila). *Silene Armeria* into red, rose, and white. *Brunella vulgaris* forms a constant white flowering and brown caliced intermediate type.

From these and numerous other experiments I deduce that the law of separation in crosses, discovered by Mendel for Peas, has a very general application to the vegetable kingdom, and that it has a paramount significance in connection with the study of the units of which the specific characters are made up.



## ON CROSSES WITH DISSIMILAR HEREDITY.

By Professor HUGO DE VRIES.

[Translated by permission from the REPORT OF THE DEUTSCHE BOTANISCHE GESELLSCHAFT. 1900. Vol. XVIII.]

(Preliminary Communication.)

IN the previous paper upon the Law of Separation of Characters in Crosses,\* I have shown that this law, which Mendel had deduced from his investigations with regard to Peas, is very generally applicable in the vegetable kingdom, and of especial significance in connection with the theory of cross-fertilisation. The important and extensive researches of Correns, Tschermak, Webber,† and others, which have been subsequently published, have confirmed, on the one hand, the correctness of Mendel's deductions, and, on the other, the justification of this general application.

Mendel demonstrated by his crossings of Peas that the results could be simply deduced from certain principles. In the first place he found that in the vegetative development of the cross-progeny one of each pair of characters is dominant and the other recessive. At the formation of the sexual organs, however, the two associated antagonistic characters in the cross separate from each other in such a way that as regards each individual pair of characters the ovules and pollen grains no longer partake of the nature of a cross. This separation occurs in equal parts, so that 50 per cent. of the sexual cells contain the one character of each pair and 50 per cent. the other. With respect to this separation, the two antagonistic characters are of equal value, independently of the question whether they, in the vegetative stage, are dominant or recessive.

Such an equivalence is, however, by no means essential. The characters may, in other cases, become of unequal value at the separation. They will then either not separate at all, or in their separation follow other rules. Such a case of non-separating crosses Mendel found in *Hieracium*; these follow other rules than the Peas in so far that the cross progeny of the first generation are dissimilar.‡ The rule of prevalence (*Prävalenzregel*), as Correns calls the dominance, is here a different one. Mendel, however, had not the opportunity to extend his researches further, and he therefore did not discover whether one of these two types—*Hieracium* or Peas—would have a more general application in the vegetable kingdom. It is for this reason that his results were regarded, until recently, as isolated cases without an important principle being involved therein, and they consequently lapsed into oblivion.

Much later, in the year 1891, Millardet discovered, in his pioneer

\* Compare also "Sur la Loi de Disjonction des Hybrides," *Comptes Rendus de l'Académie des Sciences*, Paris, March 26, 1900.

† Compare the collection of literature on this subject made by Correns in the *Botanische Zeitung*, Aug. 1, 1900, No. 15, pp. 229-238. Also C. Correns, "Ueber Levkoyenbastarde," *Botan. Centralblatt*, vol. lxxiv., 1900; and Herbert J. Webber, "Xenia, or the Immediate Effects of Pollen in Maize," U.S.A. Department of Agriculture, *Bull.* No. 22, 1900.

‡ G. Mendel, "Ueber einige aus künstlicher Befruchtung gewonnene *Hieracium-Bastarde*," *Trans. Naturf.-Verein Brünn*, vol. viii. part 1, 1869, pp. 26-31.

work with respect to false crossing, a series of new non-separating crosses.\* These he obtains by union of *Fragaria*, *Rubus*, &c., and found them to be uniform in the first generation; they resembled either the father or the mother. He proposed for the non separating Hybrids the name of False Crosses; consequently those cases in which Mendel's law of separation is followed may be termed 'True Crosses.

With these two cases before us there exists obviously a third possibility, viz., that crosses may separate according to other rules. Such cases, indeed, I have found to exist; they showed themselves to be far more nearly related to false crosses than to true ones, and are therefore ranked with the former.

I will therefore henceforth name those crossings whose produce, when the sexual organs are formed, separates equally, and which therefore follow Mendel's law, Equal Heritors (*erbgleich*) or Isogons, and their progeny—i.e. the crosses themselves—True Crosses.

On the other hand I will call those crossings whose produce at such stage either does not separate, or separates according to other rules, Unequal Heritors (*erbungleich*) or Anisogons, and their progeny, as Millardet does, False Crosses.

There appears at present no reason to assume that the crossings of unequal heritage in the plant world are rarer than those of equal heritage,† and the very general occurrence of the latter naturally does not stand in the way of this. So far as my experience has hitherto gone, the former are certainly no less numerous than the latter. In addition to the genus *Oenothera*, of which I intend here to treat, I found several characters of unequal heritage which are widely spread in the plant world, as, for instance, Polycephaly, Tricotyly, Syncotyly, &c. On the whole I think that I have made far more crossings of unequal heritage than of equal, but this can hardly be numerically defined.

In my previous paper on Separation of Characters I expressly confined myself to the true crosses, and for the time being wholly disregarded the false hybrids of Millardet (see note, p. 214). I have there deferred the consideration of these for another paper, and purpose now to give a preliminary report upon them. I will, however, only refer to my crossings in the genus *Oenothera*.‡

*Oenothera muricata* ♀ × *biennis* ♂§ is a typical false cross, which agrees exactly with the examples given by Millardet. It displays the paternal character with the exception of fertility, which is much reduced, while, in accordance therewith, the vegetative parts are more luxuriantly developed. The stalks, and especially the flower stems, are far more richly furnished with leaves. This cross I effected in 1895. In the first generation I had fifty crossed progeny, all like each other. I collected the seed from two-year-old examples (1897) and have since had three other one-year-old generations of about same extent. Separation did not

\* A. Millardet, "Note sur l'Hybridation sans Croisement, ou Fausse Hybridation," *Mém. Soc. Sc. Phys. et Nat. Bordeaux*, vol. iv. (4 Series, 1894, pp. 1-28).

† Correns is certainly of a different opinion, and regards the cited *Hieracium* crosses as exceptions to Mendel's law.

‡ For the description of the new species of this genus named hereafter, I refer to the first volume of my *Mutationstheorie* (Leipzig: Veit & Co.); and for detailed description of my crossing experiments, to the second volume of the same work.

§ Compare Focke, *Die Pflanzenmischlinge*, p. 163.

occur, the cross type remaining always the same as it was immediately after the cross.

Other crosses in the subgenus *Onagra* with the older species behaved precisely similarly. In 1894 I crossed (*Enothera Lamarckiana* ♀ with *E. biennis* ♂. The cross-type was uniform, and was maintained without separation in subsequent sowings. *E. Lamarckiana* × *E. muricata* gave same results, &c.

Uniformity of the first generation is the rule for the Mendelian crosses, independently of secondary characters which arise through unusual nourishment of the seed, &c. For the false crosses, however, it is by no means to be expected, as we have already learned from Mendel's *Hieracium* crosses cited above.

The new species of *Enothera*, which originated in my trial garden, have afforded me splendid material for the study of this non-uniformity of the first generation. I observed this non-uniformity clearly for the first time in 1895 in a crossing made in 1894 with *E. lata*, and have annually since then effected more and more of such unequal heritage crosses. The genus *Enothera* is particularly fitted for such purposes, since the crossing can be conveniently effected, each of them yields a sufficiency of seeds, and especially as the various types are often easily and distinctly to be distinguished in the quite young plants.

For the first example I select a crossing between *Enothera Lamarckiana* ♀ and *E. nanella* ♂.\* In the summer of 1898 I have effected crosses between these two plants, and sowed the resulting seed separately. The progeny, i.e. the first generation of crosses arising from these seeds, displayed always two types, that of the father and that of the mother, but in very varying ratios. I have counted the separate crops, and found the following percentages of *E. nanella*:—1, 2, 3, 3, 4, 5, 5, 7, 7, 7, 9, 9, 11, 13, 13, 13, 15, 16, 17, 17, 17, 19, 19, 19, 20, 21, 21, 21, 22, 23, 23, 24, 24, 26, 26, 28, 35, 39, 48. Or, grouping the separate crosses together—

Percentage *nanella*: 1-5, 5-15, 15-25, 25-35, 35-50

Crossings: 7 10 16 4 2

showing an average of about 17 per cent.

In previous and subsequent years I have made about an equally large number of crosses between these two plants. They yielded very rarely 0 per cent., and so far never over 50 per cent. *nanella*.

In the subsequent generations these crosses when self-fertilised were of both types and constant. The second generation consisted therefore of *E. nanella* alone from the *E. nanella* resulting from the first cross, and of *E. Lamarckiana* alone from this type simultaneously raised. So far, however, as the grandmother used for the crossing was mutable, so were the offspring derived from the cross.

So likewise was it with fifty crosses effected in 1898 between *Enothera lata* ♀ and *E. Lamarckiana* ♂. The progeny displayed the two parental types, and *E. lata* resulted thus:—

Percentage *lata*: 1-5, 5-15, 15-25, 25-35, 35-45

Crossings: 2 6 24 11 7

showing an average of about 23 per cent. *lata*.

\* Compare *Botanisch Jaarboek Dodonea*, 1897, p. 73: and *Comptes Rendus de l'Acad. des. Sc. Paris*, Oct. 1, 1900.

With trials of less extent the numbers, of course, appear to be more diverse. *Enothera Lamarckiana*  $\times$  *E. Lam. cruciata*, for instance, in four trials yielded 0, 0, 1, and 28 per cent. of plants showing the *cruciata* character.

It follows from this that if only a few crosses be made it is a matter of chance in such cases what percentage results.

In like manner, if reciprocal crosses be compared with one another on too small a numerical scale, the differences can apparently be very great. The larger, however, the number of crosses effected, the greater will be the agreement. I quote the percentage of *nanella* from four crossings of (*Enothera nanella* ♀  $\times$  *E. Lamarckiana* ♂ for comparison with the percentages given above of the reciprocal cross. I found 7, 21, 21, 29 per cent. *nanella*.

There is a possibility that the variability shown in the heritage numbers may be determined partly by internal and partly by external causes. By means of a deliberate choice of the pollen and of the flowers to be fertilised, and also by artificial interference, it must be possible to influence this variability in definite directions. In this way I succeeded, in 1899, in reducing the yield of *nanella* from eight crosses between *E. Lamarckiana* ♀ and *E. nanella* ♂, nearly 1,800 seedlings being concerned, to 0-5 per cent., and in eight further crossings, involving about 1,600 seedlings, I reduced it to *nil*.

On the other hand, the yield of crosses displaying the younger character may be increased. I, for instance, obtained in extreme cases in the first generation from

*E. Lamarckiana*  $\times$  *E. gigas* 100 per cent. *gigas*

*E. Lamarckiana*  $\times$  *E. rubrinervis* 73 per cent. *rubrinervis*.

In like manner the crossing of *E. nanella* ♀  $\times$  *E. biennis* ♂ with respect to the first character yielded, according to the choice of the pollen, in some trials about 0 per cent., in others up to 96 per cent. *nanella*.

From these figures the deduction follows that the non-uniformity of the first generation of false crosses can be easily overlooked or even be lacking altogether. Extreme conditions of the experiment may, especially when the sowings are small ones, easily result in only one type appearing. In such cases one must be very careful, because it cannot even be determined by a solitary sowing whether the effected cross be one of equal or unequal heritage. The repetition of the experiment on a larger scale or the study of the second generation can alone permit of a decision.

As examples of a ditypic first cross generation I may cite the following crossings:—(*E. Lamarckiana* ♀  $\times$  *E. suaveolens* ♂ (= *E. odorata*, Hort) yielded me two types—the maternal, bearing, however, *suaveolens* flowers, and the paternal. It was the same with (*E. Lamarckiana*  $\times$  *E. hirsutissima* (= *E. biennis hirsutissima*, Gray), and with a series of further crossings.

In the cases so far cited the first generation after the cross was mono- or bi-typic; it may, however, display three or more types.

Such may be the case, among others, when two species by various mutations have arisen from one and the same species. In such case, the earlier character, which has been lost in the new form, may reappear through the crossing.

In this way, for instance, in my trial garden there have originated from (*E. Lamarckiana* two new species, those cited above as (*E. lata* and (*E. nanella*, which differ from it more or less in every organ and are of entirely different habit of growth. If we cross these, four types may result—viz., the two parental ones, one which is simultaneously *lata* and *nanella*, and one in which these two characters are absent. These last individuals, however, display the character of (*E. Lamarckiana*, which is latent in the parents.

The trials showed that *lata-nanella* examples certainly appear but are always rare, and that the three other types appear in varying though in often nearly equal proportions. The crosses are so similar to the parent or grandparent that they cannot be easily discriminated. I found, for instance, in the seedlings of a crossing effected in 1896 the following proportion of examples with the characters of

( <i>E. lata</i>	30 per cent.
( <i>E. Lamarckiana</i>	18 „
( <i>E. nanella</i>	17 „

And so with other trials. I then tested a number of the *Lamarckiana* and the *nanella* examples for constancy, and so far I have found them to come always quite true from seed.

It is worth while to add another consideration regarding this trial. Through the crossing the latent character of the common progenitors reappeared. If the origin of (*E. lata* and (*E. nanella* had been unknown it is clear the result of the crossing would have betrayed their pedigree. And it appears to me that we have here a very important principle, which later, perhaps, may afford an experimental basis for the study of plant origin.

So far we have only considered such crossings the product of which does not separate after self-fertilisation. Cases, however, occur, even among the false crosses, of separation. They appear, however, to be very rare, and since the individuals concerned are not differentiated by any character from the non-separating ones, it is a matter of chance whether precisely these are chosen for self-fertilisation. Only very extensive cultures could lead to any definite result.\*

The finest character in the genus (*E. nothera* by which the separating false crosses may be studied is that which is termed *cruciata*. For a very long period this has been known as a widely spread North American species, (*E. cruciata*, Nuttall, but it appears now also as a sub-species of (*E. biennis* and (*E. Lamarckiana*. The four petals are narrow, ribbonlike, and form together a small cross, whence the name. In 1895 I have effected two crosses between (*E. Lamarckiana* and (*E. biennis cruciata*. The first generation of the cross progeny was, as regards the petals, uniform; the *cruciata* flower was entirely absent. In one of the two trials I self-fertilised four examples taken at random, excluding foreign pollen. Three of them yielded in the second generation a constant progeny without a trace of *cruciata*. The fourth example, however, when sown separately, yielded in 1897 about 50 per cent. of individuals with broad cordate petals and about an equal number with narrow linear ones. The actual numbers were 57 per cent. of the first and

\* Last summer I planted out about 200 square metres with crossings of (*E. nothera*.

43 per cent. of the second group, about forty flowering plants being concerned. In the third generation the progeny of the *cruciata* flowered examples proved constant; in the fourth, however, a separation again took place.

Such separations in the later generations have the value of atavism, and may probably throw some light on this enigmatical phenomenon.

A second example I give from a crossing of *Oenothera rubrinervis* ♀ and *O. nanella* ♂, which I effected in 1893. The first generation yielded only two types, that of the mother, and in lesser number (about 8 per cent.) that of the common progenitor (*O. Lamarckiana*; *nanella* forms and *rubrinervis-nanella* combinations were absent. Of both types, at the flowering time, several were fertilised with their own pollen. In the next generation it then appeared that in both types there were some constant and some separating crosses. The separating *rubrinervis* plants yielded thereby in a progeny of about 300 individuals 18 per cent. dwarfs, which at the same time displayed the characters of *O. rubrinervis*, i.e. *rubrinervis-nanella*. So far this combination of forms has remained constant in subsequent sowings. *Nanella* plants, which were not at the same time *rubrinervis*, were not absent in these trials, but were rare.

If no pure types be crossed, but only types already obtained by crossing, the non-uniformity in the first generation becomes naturally increased. I obtained by exchange an *O. cruciata*, Nutt. ×, which agrees thoroughly in all characters with the species so named, and, with the exception of the *cruciata* character, comes true from seed. With the pollen of this I fertilised in 1898 several plants of *O. Lamarckiana*. From the crossed seed I obtained a culture of about 300 plants of four types. One was quite common, and formed about 94 per cent. of the individuals. It strongly resembled *O. muricata*, but with looser spikes and with flowers the size of *O. biennis*. The *cruciata* character was absent throughout. Some individuals were self-fertilised: two of them turned out to be perfectly constant in their progeny of over 100 individuals; a third did so likewise, with the exception that the *cruciata* character reappeared in seven out of ninety-one plants.

The other three types of the first generation more or less resembled *O. biennis*. One was barren, another, coloured red-brown like *O. cruciata*, Nutt., was constant in a progeny of about 130 seedlings; the third, however, separated. This yielded only a few seeds when self-fertilised, from which only fifteen plants resulted; these were, some of them, similar to *O. biennis*, but red-brown, some similar to the mother, and some formed other combinations of the grandparental characters. So far the *cruciata* flowers have failed entirely to appear in the offspring of the two last cited types.

From these and many further experiments it results that crossings of unequal heritage in the genus *Oenothera* present a greater multi-formity than has been described with respect to other groups. The first generation is sometimes uniform, but often of two or more types. The crosses of this generation when self-fertilised are as a rule constant through their seed; sometimes, however, there arise, among the constant ones, also some which separate again.

These last separate then, not into equal, but into unequal parts.

It would take too long to treat here of the relations between crossings of equal and unequal heritage. I would, however, remark that both processes may take place simultaneously. In one and the same crossing one pair of characters may be equally transmitted and the other unequally. An example of this I have previously described under the name of (*Enothera Pohlana*.\* This is the cross progeny of (*Enothera lata*, which, as above mentioned, yields false crosses, and of (*E. brevistylis*, which yields true ones. The first generation consists therefore in part (mostly 15 to 20 per cent.) of *lata* plants, in part of *Lamarckiana* individuals; both types, however, as regards the *brevistylis* character, are true crosses. In the second generation the length of the style varies, there appear partly true *brevistylis* plants and partly plants which at one and the same time are *lata* and *brevistylis*, and these occur together in proportions which agree with Mendel's law.

\* *Botanisch Jaarboek Dodonaea*, Gent, 1897, pp. 74 and 90.

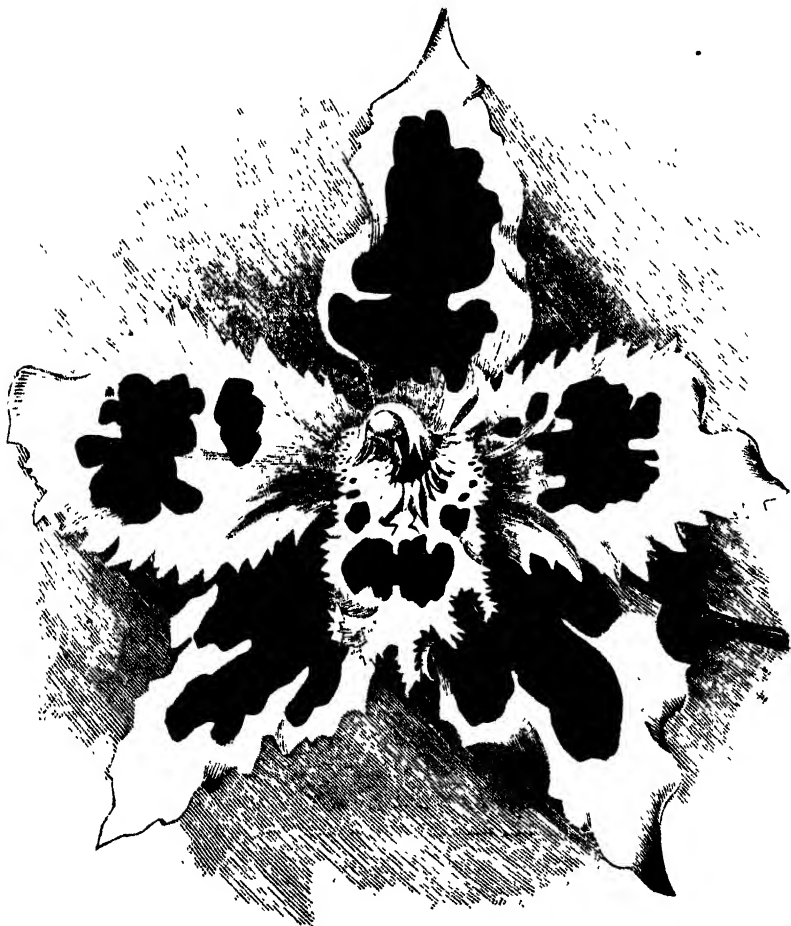


FIG. 123.—*ODONTOGLOSSUM CRISPUM NOBILIUS*. (*Journal of Horticulture*.)

## MISTAKES IN ORCHARD MANAGEMENT, AND HOW THEY MAY BE AVOIDED.

By Mr. JOHN ETTLE, F.R.H.S.

[Read October 23, 1900.]

THE whole of the illustrations in this paper, with the exception of fig. 3, are reproduced from photographs taken in Somerset. It must not, however,

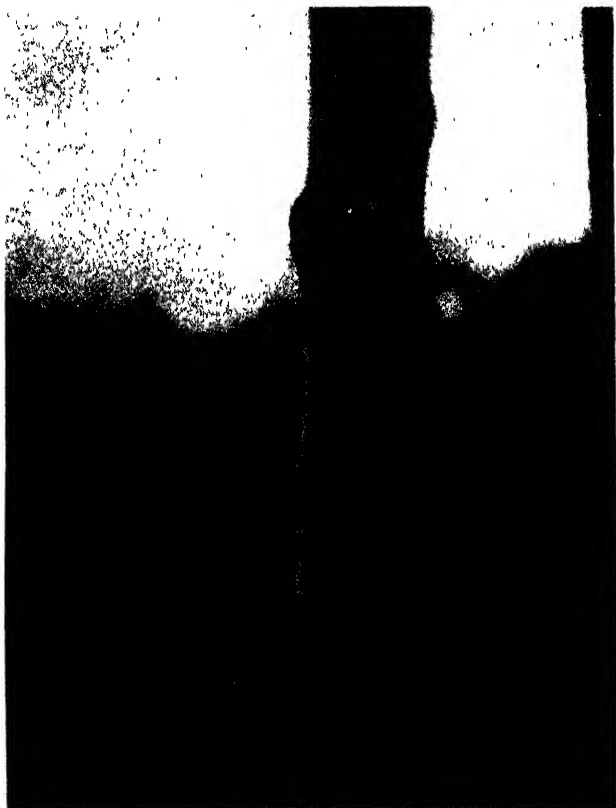


FIG. 124. - A YOUNG TREE INFESTED WITH AMERICAN BLIGHT.

be supposed that in Somerset alone can such mistakes be found, as I believe it quite possible that similar ones are made in the neighbouring counties of Devon and Gloucester, as well as in others farther away, Hereford and Worcester among them. My object will be to point out a few mistakes most commonly made by nurserymen, landowners, and tenants; in the way trees are sometimes sent out; in the way some owners treat their tenants, and some tenants treat their landlords; in the practical details of orchard work, such as selecting varieties and sites, planting, staking, pruning, and manuring trees. I am fully aware that to many my remarks may not be

of much use, may seem too obvious and elementary, but I hope a few Fellows when they read our Society's widely circulated *Journal*, may be able to gain some hints of use to themselves or to their neighbours.

#### A NURSERYMAN'S MISTAKE.

As our trees have to be propagated and trained in the nurseries before we can select and plant them, my first illustration (fig. 124) shows a young standard tree infested with American blight (fig. 126), which it brought with it from a nursery. The tree is one among others planted in a small orchard in what we know as virgin loam, where, as far as I could ascertain, there had never been fruit trees planted before. It was

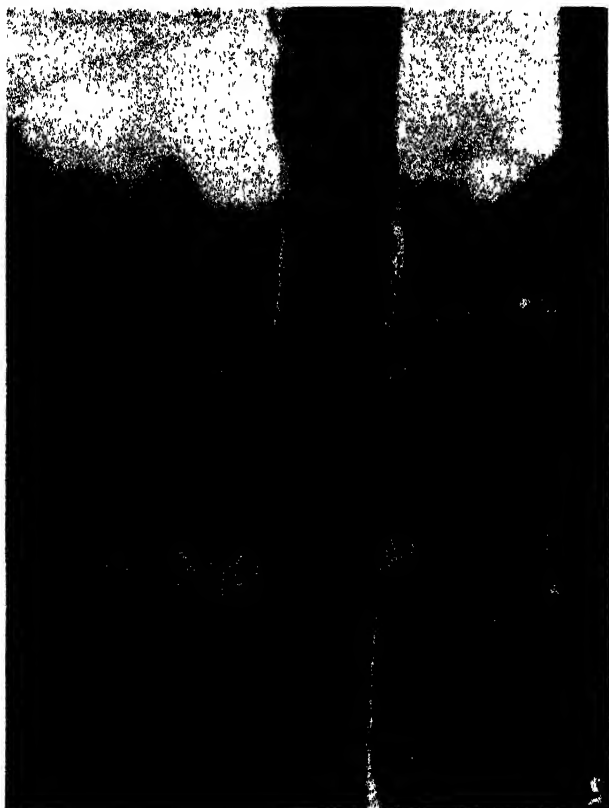


FIG. 125.—THE SAME TREE AFTER A DRESSING WITH "ABOL."

planted two years ago, and the tenant informed me he had noticed the blight early in the first spring after it was planted, but, not knowing what it was, he did not trouble to dress the infested parts. Now, as it was practically impossible for the tree to become infested where it stands, there being no other fruit trees near, we came to the conclusion that the blight must have been introduced with it from the nursery, and we were satisfied that this had been the case when afterwards we paid a visit to the nursery in question. All of the trees in this small orchard had American blight, more or less. I know well that in our large nurseries,

where a large staff of skilled men are employed, every effort is made to keep the trees clean; but in some of the smaller ones, understaffed (from one of which the trees under notice were obtained), time cannot, or is not, given to the work. Is not this a grave mistake? It is comparatively easy to keep young trees clean in a nursery, but when an infested tree is sent out to be planted among others the pest is quickly spread, and infests what may have been previously a clean plantation. I have seen several instances where American blight has been introduced with grafts from a nursery, and where clay has been used in the grafting, healthy and thriving colonies of insects have been found in the following summer. When wax is used there is no harbour for them. A good wax can be made with equal parts by weight of Burgundy pitch, beeswax, and olive oil. It is best used warm. Many insecticides are recommended to get rid of this blight.

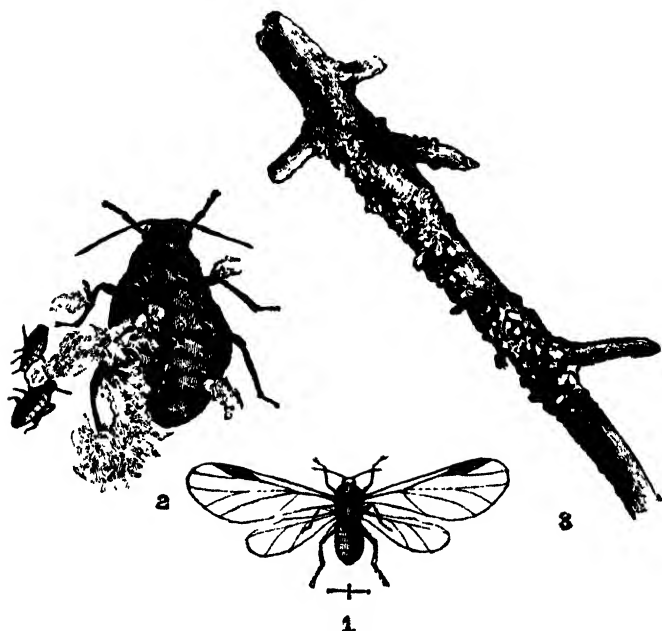


FIG. 126. - AMERICAN BLIGHT IN VARIOUS STAGES. (*The Garden*.)

Gishurst compound is quite safe and effective; so is tobacco water, made with one ounce of black shag to two quarts of boiling water. Petroleum may be used in winter when the bark is hard, but is dangerous in summer. Brush it well into all infested parts with a half-worn-out paint brush during the winter months. Follow it up well in the spring and summer with the Gishurst or tobacco water, brushing this again carefully into every spot where a bit of the woolly-looking stuff is to be seen. Fig. 125 shows the same tree after a dressing of "Abol" used at three times the strength recommended for green fly, and applied with an "Abol" syringe, which forces the liquid into the crevices better than can be done with a brush. I have used this preparation, at the strength above given, on tender shoots and found it safe and effective. I wish to lay special stress on this fact that young trees may be kept clean, but if they grow on for fifteen or twenty years with the blight constantly propagating itself, it

can only then be exterminated by a very great amount of trouble and expense, more, possibly, than the trees would be worth for several years to come. A good illustration of this blight in various stages is given in fig. 126.

#### LANDLORDS' AND TENANTS' MISTAKES.

Efforts to improve the orchards of the country will not be entirely successful until there is a better understanding between these two classes. Landlords say, "I will not buy any more trees for Farmer So-and-so, as the last I gave him were ruined for want of a little



FIG. 127.—BAD PRACTICE IN PLANTING AND FENCING TREES.

attention. It was too much trouble for him to keep the ties good, so the trees were blown against the stakes and injured, and if a rail of the fencing broke he wouldn't as much as nail another on, so the cattle got at the trees and barked them." The tenants say, "How can I be expected to buy expensive trees and pay for the planting and fencing when my landlord will not allow me a stake or anything towards it, and I may have to leave at a year's notice? I asked the steward last rent day if he would allow me some new trees, but he said 'Times were not good enough.' Then I asked him if he would give me stakes or fencing if I bought the trees myself, but he said 'Timber was scarce on the estate and too dear to buy.' So if the estate is too poor to allow a little for these

things, I'm not going to spend my money to improve other people's property, with very little chance of getting anything out of it myself."

These were almost the exact words used by an owner and a tenant respectively in conversations within the last six weeks. A few years ago the owner had planted a new orchard of fine trees, had them securely fenced, some with iron and some with wood, and carefully tied so that they could not move about. On paying his tenant a visit this summer he found many of the trees with the ties broken, blowing about with every wind, the bark getting badly bruised, making wounds which would form

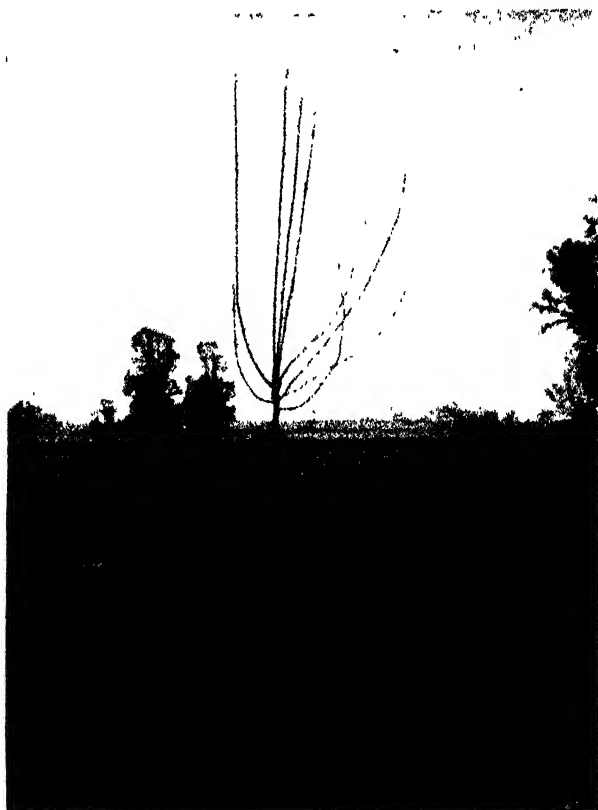


FIG. 128.—TREE TOO OLD TO TRANSPLANT WELL.

suitable attacking places for American blight or canker. That was a tenant's mistake.

When visiting a tenant farmer he showed me some very fine, well-grown Apple and Pear trees, of the choicest varieties, planted last year. Discussing the cost of trees, planting, and fencing, I said, "Your landlord allows you timber, of course?" Saith he, "Not a foot; I have had to find it all myself." This was on one of the largest estates in the county, and the tenant, who has a general smithy and wheelwright's business as well, had used up his own spare timber and his own iron for "guards." 'This was the landlord's mistake; or *was it the agent's*? Here was a tenant, willing and desirous of improving his orchards, receiving absolutely no

encouragement from his landlord. On some few estates we find that the landlord supplies trees, and wood for fencing, and the tenant the labour for planting and fixing the same. This works to their mutual benefit, as the owner's land is improved, and the tenant, although he will have to wait a few years for it, will gradually get an orchard of trees from which he gets the best produce, which alone pays now-a-days. I am convinced that on many large estates it would pay the owners to employ qualified men to look after their orchards. Then they would be able to make good selections of varieties, see to the planting, fencing, and pruning of trees,



FIG. 129.—NO PRUNING—NO GROWTH.

the landlord providing trees and material, and the tenant the necessary labour. The orchards then would gradually improve in value, an out-going tenant would not be able to raise the oftentimes vexatious question of compensation for improvements, and the owner would not have to come upon an out-going tenant for dilapidation, unless the trees had been injured by the gross neglect of the latter. Also, if the landlords had nurseries of their own, their orchard men would have something to occupy their summer time.

#### MISTAKES IN SELECTION OF VARIETIES.

The most common error is in selecting varieties unsuitable to the soil

and district. In visiting fruit shows a visitor may see a handsome-looking variety, and order some trees of it, to find afterwards it is not a good "doer" in his district. My invariable advice to planters is:—"Unless you already know, ascertain what varieties do well in the neighbouring orchards, and plant largely of these. A few others not so well known you should plant as an experiment. Then, instead of selecting from a specimen tree at your market, go to your nurseryman when the trees are in fruit; he will be very pleased to show you his stock, and you can sample, as well as see, the fruits. The trees selected will be marked 'sold,' and reserved

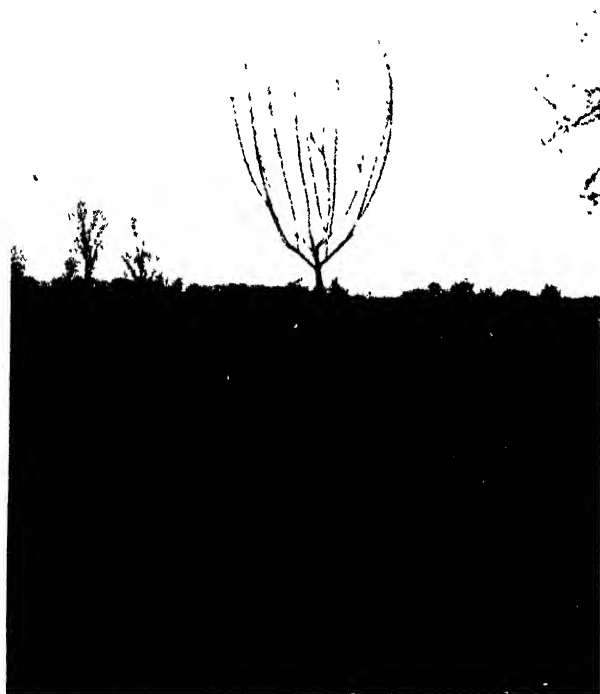


FIG. 130.—A STUNTED 8-YEARS-OLD TREE.

for you, so that when you have your soil ready for planting, the nurseryman will take up the trees, despatch them at once, and their roots will be as short a time out of the ground as possible. Better trees can be obtained in this way, and planting can be done earlier in the season."

Then the question arises, "Shall I plant early, midseason, or late varieties?" Here the planter must be guided by requirements. If just for home consumption, or for an assured sale all through the season, he must plant some of each section. If for a distant market, early and late varieties pay best. Midseason fruit sometimes does not pay for the carriage, owing to a glut in the market. In many districts the earliest varieties pay best, and are the most constant in bearing. Through the

crops being gathered early more nourishment goes to plump up the buds for the next year's crop.

Cheap trees seldom prove satisfactory. We know most farmers dearly love a bargain, and, possibly, a neighbouring grower will meet a farmer at a "market ordinary," and say, "Look here, farmer, I've got a lot of trees I will sell you cheap. They are not in first-class condition, but you can plant them out in a bit of spare garden for a year or two and they will soon come on." The bargain is made, and the trees planted in the spare bit of garden. Some of them may make decent trees in a few years, but very probably the majority will not. I saw such a cheap (?) lot some time



FIG. 131.—BETTER PLANTING.—HOLE 6 FEET WIDE.

since, and the stems were more suitable for building a rustic arch or chair, they had so many crooks and bends in them. This was certainly a mistake in selecting. A nurseryman, who knew his business, would burn such refuse rather than sell it to injure his own reputation.

It is not often a tenant can select his site for planting, he has just to make the best of the land he has. Where mistakes are made is in planting on low swampy ground (where the frosts frequently injure the fruit blossom), on hilly ground (where, in a dry season, there is insufficient moisture for the roots), and at a distance from the home. In the latter case pilfering is much easier than when the orchard is near the house and under easy supervision.

## MISTAKES IN PLANTING AND FENCING.

Fig. 127 shows two mistakes very commonly made in planting and fencing. The hole is too small, barely two feet wide, and *the roots have been cut to fit the hole*. There is no stake to it, its only support being the fence of thorns, and being a tall tree it is blown about, loosening the roots and bruising the bark. It was planted in November 1899, by a tenant who gave up his farm the following Ladyday, in fulfilment of a condition (a very common one) in his lease which said, "Any trees which die from any



FIG. 132.—THE SAME TREE WITH A MULCHING OF STRAWY MANURE.

cause must be replaced by the tenant, who will have the old tree to do as he likes with." These may not be the exact words, but they convey the meaning. On this estate—one of the largest in the county—the landlord allows nothing towards planting or staking. It is a very much better tree than many planted under the same conditions, as the tenant would have acted up to the letter of his lease if he had put in anything resembling a tree. Fig. 128 shows its full size. It is a very strong, healthy growing variety known as 'Morgan Sweet,' very commonly planted in Somerset, and usually grafted two or three years after planting. The price of these trees was 4s. 6d. each. Most varieties do well head-grafted on 'Morgan Sweet,' but it is a long time before a tree becomes fruitful, reckoning from

the time it was worked. The one under notice was six years old when planted (two or three years older than they should be); it will be at least eight years old before it can be re-grafted, as it is growing so badly, and we cannot say how old before it bears fruit. Fig. 129 is from a photograph taken in October 1900, where we see it has made no growth, but only a few leaves. If it had been cut back rather hard in the spring it would probably have made a little better growth; it could not possibly have made less. Planting in a small hole, and in an orchard which may be anywhere between fifty and one hundred years old, is not a good way to induce

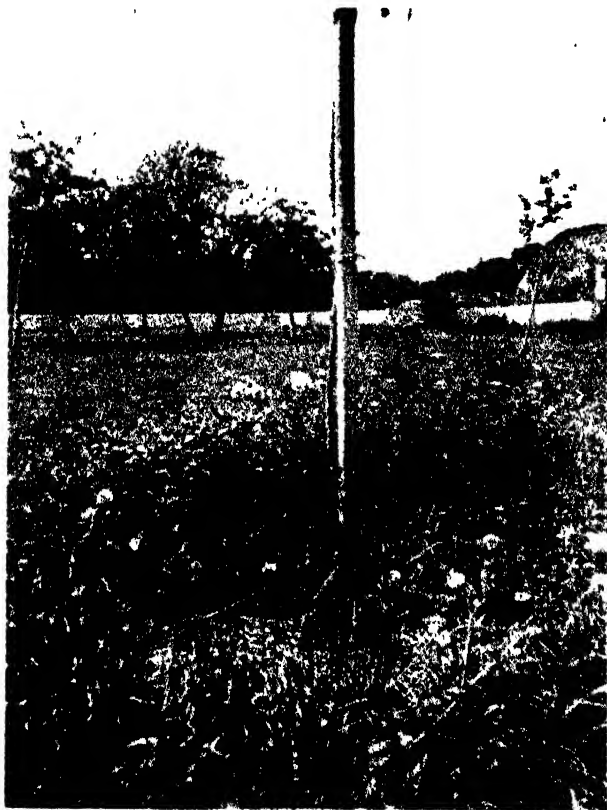


FIG. 133.—THISTLES AND RUBBISH DRAWING THE GOODNESS OUT OF THE SOIL.

healthy growth. A similar tree, at least eight years old, is shown in fig. 130. It was four years old when planted, and has never been cut back, and the only growth it has made in the four years since planting is about 9 inches on the tops of the branches, from the peculiar knobby swellings. It was re-grafted with 'Ecklinville' this year, and the grafts have taken well, but the tree will be at least ten years old before it fruits.

A better system is shown in fig. 131. This is another young tree planted in an old orchard. We often hear it said, and see it written, that planting young trees in an old orchard is bad practice, and that instead of doing this an entirely new site should be formed, allowing the old trees to gradually die down. Just so. But there is not one tenant in fifty who

has the land to spare for a new orchard, so has to make the best of what he has. Provided the old trees do not shade them too much, young trees can be made to do well if treated properly. Holes should be made 6 feet wide and two spits deep, and, if the young tree must be planted exactly where the old one stood, the soil should be carted away and replaced by fresh. In this new soil the roots will get a good start, especially if they have a mulching of manure, as shown in fig. 132. The soil under this mulching kept fairly moist all through the summer of 1900, when cracks were plentiful in the grass land round about. Allowing thistles and



FIG. 134. A HEALTHY 5-YEARS-OLD TREE.

rubbish to grow at their own sweet will, taking all the goodness out of the soil, is illustrated in fig. 133. The wavy, blurred line on the right side of the tree's stem is a fine specimen dock, which would not keep still in the rather rough wind when the photograph was taken. There being no horned stock allowed in this orchard, one stake was put to a tree, which was surrounded by 12 inch wire netting with a 1 inch mesh. The stakes were sawn out, and are 8 feet long by 2 inches square, with the sharp corners planed off. Driven firmly into the subsoil the trees were planted to the stakes, and tied with strong soft tarred cord. About 2 yards of wire are required for each tree. Where horned stock run in an orchard, a stronger fence is necessary, as will be shown later on. The

cost per tree planted as above may be useful :—Cost of tree, 3s. ; digging hole, planting, staking, and wiring, 7d. ; stake, 8d. ; wire, 3½d. ; staples, 1d. ; label, 1½d. ; total, 4s. 9d.

Referring to fig. 128, I said of that tree that it was six years old when planted. In the west many planters like trees of this age, and even older if they can get them, as they say they soon have a big tree which will stand the wind and the stock rubbing against it. This is a mistaken idea, as the older a tree gets the worse it transplants. In the small country nurseries a tree may as likely as not stand where it was worked



FIG. 135.—A POOR ORCHARD TREE. STEM TOO SHORT.

until it is sold. At six years old it will be quite a big tree with strong roots (devoid of fibre), which must necessarily be cut about severely when the tree is lifted. Planted, as is often the case, without the rough wounded ends of the roots being smoothly pared over (another mistake), it has no chance of growing, and instead of becoming a healthy tree it is stunted and looks poverty-stricken. On the other hand, if good strong healthy trees of three years old are bought and are carefully planted, and pruned at the head and roots, the weather after planting being fairly favourable, they will develop at five years old into trees like fig. 134, which is one of several planted in 1898 at the County School, Wellington, Somerset, to give the agricultural students practical instruction in some

of the details of orchard work. The students did all the digging holes, planting, staking, pruning, &c. The tree was then three years old. As it is in a fenced-off corner of a playing-field, only one stake was given, and no wiring was needed, there being no stock allowed there.

Another planter's mistake is illustrated in fig. 185. It is a home-grown tree, planted by a small tenant farmer. The stem is only about 4 feet high, and the head has never been pruned. If properly treated it would have made a decent half-standard for a garden or plantation, but is quite unsuited for orchard work.



FIG. 136. A FINE STANDARD TREE, SECURELY FENCED.

A fine specimen standard is shown in fig. 136, which was prepared from a photograph taken in an orchard in the occupation of Messrs. James Watts, cider merchants, Backwell, Bristol. It is a splendidly healthy tree, with a stem nearly 7 feet high, securely fenced. The orchard is easily seen from the Great Western Railway, about a mile on the Bristol side of Nailsea Station, and forms a good object-lesson. A few particulars as to cost, &c., have kindly been supplied by Mr. Watts :—

Size of orchard : 2a. 1r. 21p., landlord's measure, inclusive of fences.

Number of trees required : 124, planted 9 yards apart.

Cost of trees : 4s. 6d. each, delivered at Backwell.



FIG. 137 -- TREES 9 YARDS APART, IN ROWS EACH WAY.



FIG. 138.—FENCING WITH OLD RAILWAY SLEEPERS AND BARREL STAVES.

Cost of material for fencing, and labour in fixing and planting : 3s. 6d. per tree.

The trees and material for fencing were provided by the landlord, A. Gibbs, Esq., of Tyntesfield, Bristol, and the labour by Mr. Watts. The whole of the trees are of French vintage varieties, selected in Normandy by Mr. R. Brown, of Failand, Bristol; they are very well grown, with clean straight stems, and are the best of the varieties used by French cider makers. Mr. Watts, being an experienced cider maker, will be able in time to test whether his soil and climate are suitable for



FIG. 139.-BAD STAKING AND "THORNING."

these imported trees. So far, it looks as if they are. There may have been a slight amount of sentiment about buying "foreigners," but if breeders of high-class horses and cattle sometimes strive to improve their stock by importing new blood, why should not Apple growers? I hope in a few years to see some of the above varieties established on home-grown stocks so as to give them a further test. Fig. 137 shows a part of this orchard, but it is impossible to get a really good view into a  $\frac{1}{4}$ -plate camera. Still it shows good laying out and planting.

While on the question of fencing, fig. 138 shows a capital way of utilising old railway sleepers and barrel staves. The photograph was taken in Mr. Eldred Walker's orchard, White Hall Farm, Chew Stoke,

Bristol. The sleepers were split in this case, as there was no sawmill near, and the fixing was done by a labourer. The sleepers are 9 feet long (a foot of which could be cut off and used for firewood), 10 inches wide, and  $4\frac{1}{2}$  inches thick. They could be sawn into three, and the sawing at a mill would cost 5s. a ton. The sleepers cost 15s. a ton at Pensford Station, and they run twenty to the ton. Add to this the cost of carting home and to the mill and back would give, probably, a total cost of 25s., or 1s. 3d. per sleeper. The twenty sleepers would cut out sixty posts, costing 5d. each, or 10d. for each tree. The old barrel (120 gallons) cost



FIG. 140. - "SCABBY" BARK CAUSED BY THORNS RUBBING.

2s., being a castaway from the cider cellar. There were twenty-four staves in the barrel, which would each cut into two rails. Ten rails to a tree would thus cost 5d. The posts being fixed in position before the trees are planted gives better work, and the roots will not be injured in fixing. Add, for cost of fixing and nailing rails, 6d. a tree, and we have a total cost of 1s. 9d. for fencing each tree, and a very cheap strong fence it is. The sleepers, being pickled, and the rails oak, should last until the tree is old enough to do without support or fencing. There will also be 2 cwt. of prime firewood for the house.

Another case of "thorning" trees is next shown in fig. 189, and fig. 140 shows the bad effect of "thorning." The bark is "scabby,"

looks bad, and is in a poor condition to withstand attacks of canker or American blight. Negligence is exemplified in fig. 141. The ties are broken, and the tree is rubbing against the stake. The result will be something like fig. 142. Cattle and pigs seem to think that trees are simply planted for them to rub against. That they take full advantage of their opportunities is shown by the trees in fig. 143. This is a mistake in the management of young trees. Careless fencing, or none at all, gives cattle an easy chance to overturn a tree and break off the branches. They have broken one off this tree, and we can see the "snag" left.



FIG. 141. NEGLIGENCE EXEMPLIFIED—TIES BROKEN, TREE CHAFING AGAINST STAKE.

Fig. 144 is a planter's mistake which I should have mentioned before. Here we have four trees, sadly overcrowded, where there is room for one only. From the tree in front to the one on the left is only 9 ft., to the one on the right 10 ft., and to the one by the hedge about 16 ft. Trees cannot grow well cramped up like this. Those shown are growing "all shapes," and it makes one feel miserable to look at them.

#### MISTAKES IN PRUNING.

Passing now to a different part of my subject, I will endeavour to point out a few mistakes in pruning, taking young trees first. With fruit

growers there is occasionally a difference of opinion as to whether young trees should be pruned, say, in the spring following the planting. I think they should, and will try and give a few examples. The next two figs., 145 and 146, show two healthy young 'Tom Putt' trees, planted in the autumn of 1898. I was invited by the owner to look over his trees in March 1899, and, discussing pruning, he said, "Would you cut back these trees or not?" I said, "I should, every one." He did not agree with me, and said he would rather leave them a year to become rooted and then cut them back, as he had always been told it was a bad plan to cut

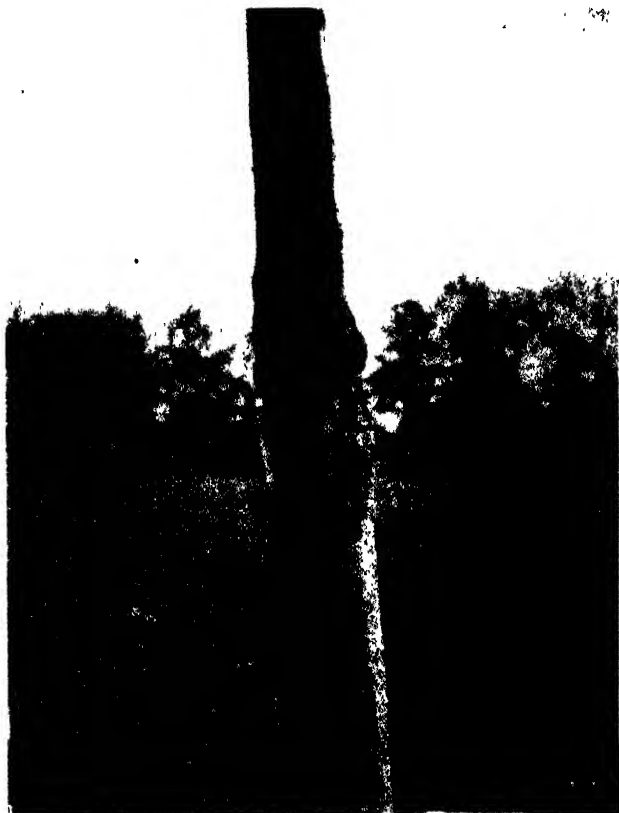


FIG. 142.—RESULT OF NEGLIGENT STAKING.

away any of the branches after the roots had been cut about. I tried to convince him that it was just the opposite, and that through some of the roots having been cut off a part of the branches should also be removed to balance the transaction. He could not take this view of it, but consented that I should prune one tree out of four of the same variety. The two trees shown were then as near as possible of the same size and shape, fig. 145 being the unpruned one. The pruned tree, fig. 146, did not make such strong growth as I had expected, but the season was a remarkably dry one, and the photographs were taken in the July following, when there had been scarcely any rain.



FIG. 143.—RESULT OF NEGLIGENT STAKING—TREE ALMOST PUSHED OUT OF SOIL



FIG. 144.—A PLANTER'S MISTAKE—FOUR TREES WHERE THERE IS ONLY ROOM FOR ONE.

It requires a great deal of experience before one can know how to prune all varieties properly. The tree shown in fig. 147 is a four-years-old 'Ecklinville,' a sturdy young tree, two years making the stem, and two years making the head. This variety does not require such hard pruning as some, as it breaks its back buds well. Newly planted, it was cut back last spring as shown in fig. 148, and has made good growth and formed fruiting spurs, so that next year, all being well, we may expect a few fruits from it. It will be noticed that on the two lower branches the pruning is done to an upper bud, to throw the branches succeeding higher up out of



FIG. 145. -A NEWLY PLANTED "TOM PUFF" TREE, UNPRUNED.

the reach of cattle. As the head had more branches than were required for forming a good tree, a part of them were removed entirely at planting time.

Bad, unskilled pruning is shown in fig. 149. The branch was cut to an inner bud instead of an outer one, causing the young branch to grow upward and across the one above it. These two would soon begin to chafe each other, and, in years to come, one or both would be broken off. A "snag" is also left, as the cut was not made near enough to a bud. It is these snags which are so frequently attacked by the canker, which eventually spreads down into the healthy bark, when the branch soon

begins to die away. The pruning in this instance was done in a nursery. After the first pruning of a young newly planted tree very little cutting back will be required, but it is most important that the trees should be looked over every year, and any branches which show a tendency to cross one another or to grow into and crowd the centre of the tree should be removed. With an eight-foot-handled "Standard" pruner a man can go over an acre or two of trees in a short time, for at the outside it should not take him more than an average of five minutes a tree. It is imperative that this should be done if we wish to have well-formed trees, and



FIG. 146.- A SIMILAR TREE, PRUNED IN THE SPRING AFTER PLANTING.

prevent the severe prunings and thinnings-out that would otherwise have to be done in after years.

We know that our orchards are sadly neglected, and if we did not we get gentlemen from some of the London daily or weekly papers to tell us so. Many of our County Councils are doing what they can by giving technical instruction to improve the orchards and fruit-growing generally. In Somerset the services of the County Instructor are placed at the disposal of any farmer or fruit grower in the county, and the only expense to the farmer or grower is in getting him from and to the station, and providing some simple refreshment. The farmer is asked to invite as

many of his friends as possible to meet in his orchard, and see some of the trees done. The Instructor does one or two first, and then lets any of those present take the tools, which gives them a practical insight into the work, and they get hold of the principles of pruning, and, if they wish, can go home and put them in practice on their own trees. Some of the older farmers are rather conservative, and will not have their trees touched with a knife or saw. If the trees did for their fathers they should do for them, is their argument. We get some warm discussions at times when we do not see eye to eye, but it is in these discussions that

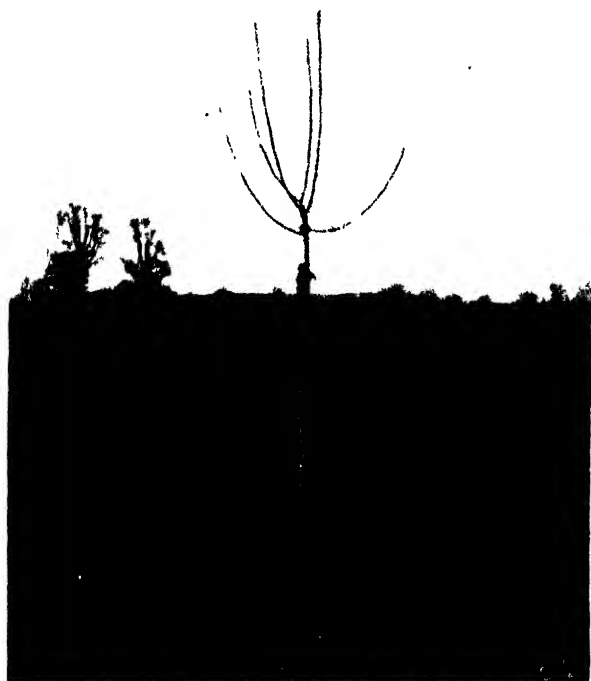


FIG. 147.—A STURDY 4-YEARS-OLD 'ECKLINVILLE.'

many useful points are brought out. With the majority of younger men we are able to make more headway, as they know that good pruning is a great factor in producing the best fruit, which alone will pay for growing. Many of these men are taking to doing the pruning themselves, and find it interesting work. Thus they will get their neglected trees gradually into better condition; but it takes a great deal of time, patience, and hard work. Why have the old orchards got into such a state? 1. Through sheer neglect or carelessness; 2. The tenant or owner, as the case may be, could not do the pruning; 3. He could not afford to have it done; 4. He could not get any one to do it who understood the work. Nowadays,

if he wishes, he may gain practical instruction in pruning, so that in the next generation the above reasons for neglected orchards should not be valid.

With old orchards a mistake is often made in giving trees too severe a pruning all at once. It is far better to do it in two or three instalments—say at yearly intervals—as then there is not the same probability of giving too severe a check to the roots. The first year the lower or under branches, which are quite shaded by other branches above them, should be removed; the next year the shaded branches in the centre of the tree; and,

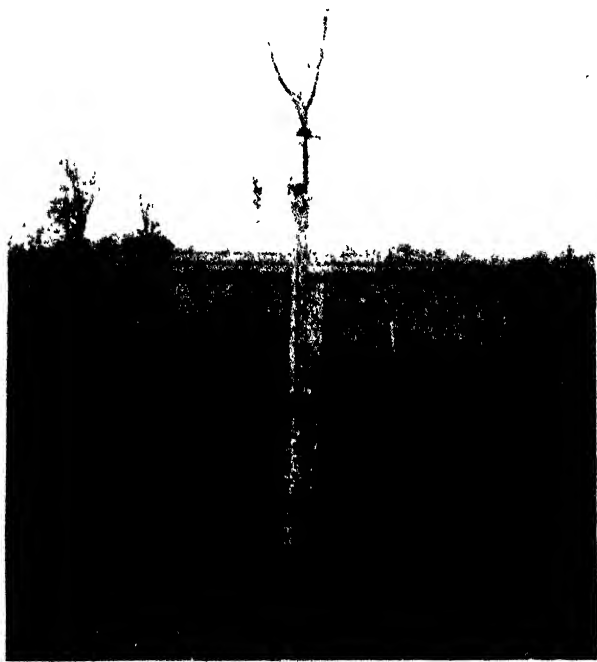


FIG. 148.—THE 'ECKLINVILLE' PRUNED.

if spread to the third year, the worst placed outer branches which are crossing each other, or which show a tendency to grow towards the centre. Then we should get all the fruiting wood exposed to the sun and air, and from this wood obtain the best quality fruit. Apples grown in the shade are generally poor in flavour if used for dessert, and if vintage fruit, it produces a thin poor cider. As a "Zummerzet" man remarked at one of our demonstrations: "That's it, zur, cut out aal them middle branches, vor we doant never get no good zuyder vrom none o' thay zhady fruit." This was in an orchard where the trees were about forty years old, and had never been pruned since they were planted. They were raised from

pips, and planted by an old labourer on the estate, and no one knows the names of them. Being in very good soil, they are fine trees, but so overcrowded that they bear a mass of small fruit *every other year*. If those trees had been well looked after, and had had better varieties grafted on them about twenty-five or thirty years ago, the orchard would be worth something now.

Mistakes are easily made in pruning old trees, and a few of them I will show. In fig. 150 we have a bit of careless work in the saw-cut, as no undercut was made. In cutting big branches the under side should



FIG. 149.—UNSKILLED PRUNING TO AN INNER BUD, AND A "SNAG" LEFT.

be sawn first, and then if the upper cut is made exactly opposite it, there is no danger of splitting as this tree has. The man who was responsible for this bit of work afterwards said to his employer: "If I'd knowed as how Mr. Ettle wur gwain to phothygraf thic cut, I'd a done he a bit different to that."

In fig. 151 we have another bit of bad work. The branches were sawn off too far from the main stem, and partly for this reason, and partly because the cuts were not afterwards pared over, the bark gradually died back. In time those snags will decay right up and into the trunk, when it will be a case like fig. 152, where you can see the woodpecker has been tapping.

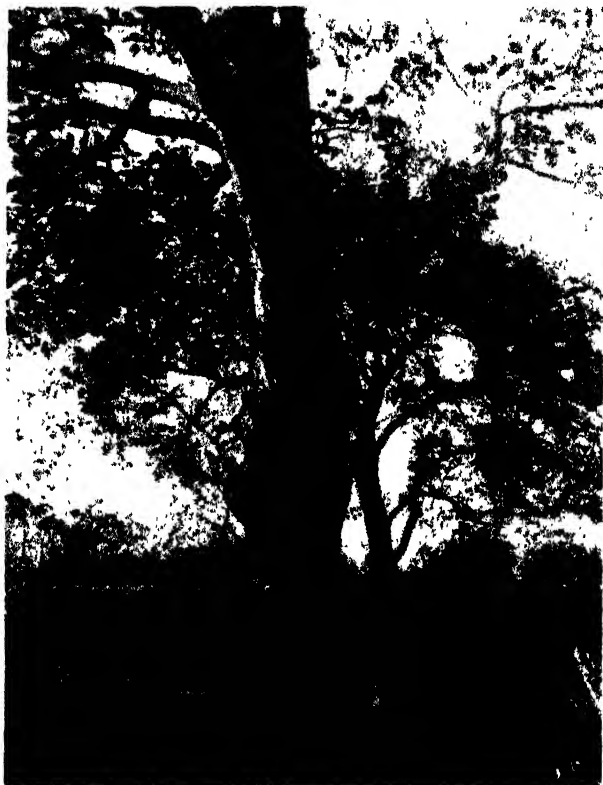


FIG. 150.—A SPLITTING CUT AS NO UNDER-CUT WAS MADE FIRST.



FIG. 151.—BAD PRUNING—BARK DYING BACK ON OLD "SNAGS".



FIG. 158. — A GOOD SAW-CUT PARIED OVER.



FIG. 152.—RESULT OF BAD PRUNING—LAST STAGE.

Better work is given in fig. 153. A well-made cut carefully pared over round the rough surface left by the saw. This will heal over in time something like the one shown in fig. 154.

In pruning old trees it is sometimes advisable to have two men at the work, one to support the heavy branches while the other does the cutting. A good sharp saw must be used, as good work cannot be done without it. Very useful sets of tools are supplied by the "Standard" Manufacturing Company, with which most of the work can be done from the ground, and ladders can be almost dispensed with. The land under well-pruned trees



FIG. 154.—BARK GROWING OVER A GOOD SAW-CUT.

is much more profitable than under the shaded ones, as the herbage is so much better.

Another specimen of bad management is shown in fig. 155, a tree pruned last season. This summer all the "brood" (a local name for young branches growing in the centre of a tree) was allowed to grow. If this goes on, in a few years the last state of the tree will be worse than the first. It should have been gone over early in the year, when the shoots were about an inch long, when they could have been rubbed off and would not have grown again. They rob a tree as much or more than did the old branches which were removed.

A grafter's mistake is shown in fig. 156. The tree was practically a worthless variety but very healthy, so a good dessert variety was put on to replace it. The grafts have taken well but were put on too high up from the main stem, so that there is a quantity of waste wood, and when fruit is borne, it will be so far from the ground that it will require a long ladder to gather it. The closer grafts can be put to the main stem the better, providing, of course, the bark is healthy.

#### A MISTAKE IN MANURING.

How many of our orchards are manured systematically? Only a very,



FIG. 155. --YOUNG BRANCHES CROWDING CENTRE OF TREE.

very few of them. They get less manure than any other part of a farm, nine out of ten only getting such as is left by the stock grazing there, which from young growing animals or milking cows is of very little value, unless they are fed "artificially." If the animals can be folded in the orchard, or fed there with cake, &c., then of course the droppings are much more valuable. If poultry run there they help to manure, and eat a number of caterpillars and grubs. A good plan is to keep them in portable houses and shift them the length of the house each day.

Liquid manure is excellent for fruit trees, and on most farms may easily be obtained, either from a cesspit, or, if this is not provided, from

a hole dug near the manure heap where the drainings may run into it. If the orchard is near the yard, it can be carried in buckets and a tree or two dressed occasionally as the liquid is obtainable. An orchard I had the pleasure of inspecting lately was treated in this way several years since by the present tenant, and the trees—before almost worthless—were brought to good health and fruitfulness. They have had similar dressings each year since, as there is a good supply from a tank. A good way to apply it to old trees, which probably have their roots deep in the soil, is to bore holes with an iron bar, beginning at a radius of about four feet from

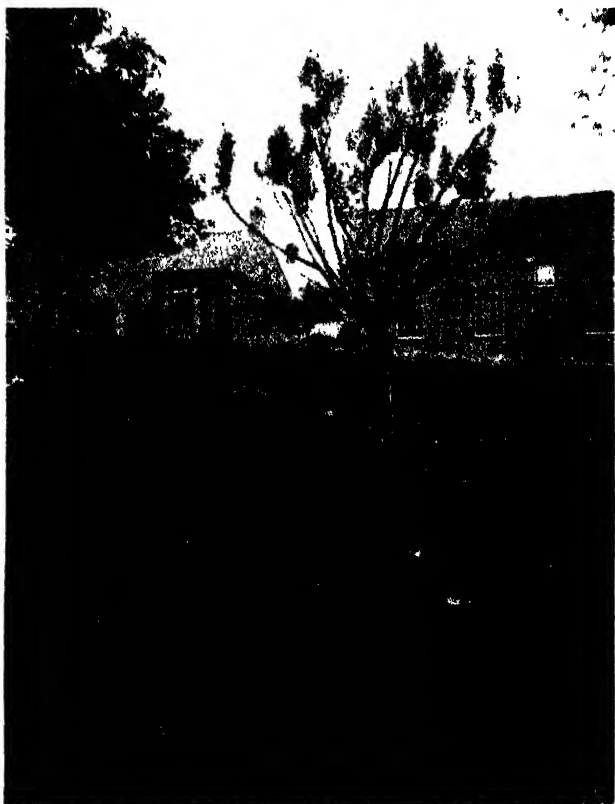


FIG. 156. - A GRAFTER'S MISTAKE - TOO HIGH UP FROM MAIN STEM.

the stem, and making them about two feet apart, and the same in depth, as far as the branches extend. If kept filled from time to time with liquid it will percolate into the surrounding soil, and the roots will receive greater benefit from it than if it had been spread on the top, when the turf would have absorbed a great part of its goodness.

Artificial manures are also excellent, and may often be used where farmyards are not available, and, being more portable, are more easily applied. The common manures, such as superphosphate, bone-meal, dissolved bones, basic slag (all phosphatic), and kainit (potassic), are good and easily obtainable. A good winter dressing would be—two parts basic slag and one part kainit, applied at the rate of about 6 oz. per square yard.

Both of these are rather slow in dissolving, especially the slag, so would take time to wash down to the roots. For spring use two parts super. and one kainit, and apply at the same rate. This is a full dressing, but, as I said with the liquid manure above, the turf will absorb a great deal of it.

I have one more mistake to point out. Those I have mentioned have dealt with the management of the *trees*, this one is made with the *produce* of the trees. So much has been written and spoken about grading and carefully packing fruit that it seems superfluous to mention it. But bad or no grading, and careless packing, are still very prevalent. Little and big fruits mixed together always sell badly—if indeed they sell at all. The same is the case if they are packed loosely and bruise. For a lesson in packing I advise any who can possibly do it to go to a wholesale salesman about the time Canadian and other imported fruit is on sale, or by attending the Royal Horticultural Society's Crystal Palace Shows they will pick up many valuable wrinkles, and, if they have not been before, will be more than a little surprised and delighted with the magnificent collections of fruits.



## THE CURRANT BUD-MITE, OR CURRANT GALL-MITE.

*(Phytoptus ribis, Westwood.)*

By Mr. ROBERT NEWSTEAD, F.E.S., Hon. Mem. R.H.S., Curator  
Grosvenor Museum, Chester.

OF the numerous pests which infest fruit trees in this country, it may be safely said this is one of the most destructive. And although a good deal of time and labour has been devoted to experimenting upon the disease \* with a view to finding out a remedy, nothing, so far as I am aware, has yet given satisfactory results, as we shall find when we come to consider the various treatments which have been adopted.

The earliest record of *Phytoptus* infestation was made at a meeting of the Scientific Committee of the Royal Horticultural Society held March 2, 1869:—

Specimens of a disease in shoots of Black Currant from the Rev. A. Fitch were then produced, Mr. Berkeley remarking that the outer bracts were hypertrophied, and, in consequence, the delicate divisions of the inner part of the bud were badly nourished, and death ultimately ensued. The chairman pointed out its probable analogy with the galls in hazel produced by a *Cecidomyia*, which was confirmed by Professor Westwood, who stated that the disease in the Black Currant shoots was produced by an extremely minute four-legged *Acarus*.—R.H.S. JOURNAL, New Series, vol. ii., 1870, p. ciii.

This, I believe, was the first authentic public announcement of the existence of the disease, although it had been previously known to growers of Black Currants as causing serious harm to their fruit for many years past, and especially so in the neighbourhood of Blantyre, N.B. Since that time much has been written in various Horticultural Journals and other periodicals concerning this pest. In 1885 Miss Ormerod, V.M.H., called attention to it in her Annual Report for that year, and also in nine other of her Reports, subsequently issued, will be found much valuable information concerning the disease and its treatment, besides a great amount of evidence from practical sources in various parts of the country; each successive Report bringing the history and treatment of the disease up to date. My own share in the investigation of the pest was published † in the *British Naturalist* for June, 1894, which was the result of a series of observations made on a plot of infested bushes during the previous year. Since the publication of the above I have continuously made extensive examinations of infested plants, thereby confirming former observations and adding thereto many interesting facts. Besides which, I have also conducted observations in the field, and have personally visited his Grace the Duke of Bedford's fruit farm, and also inspected plants under treatment in Miss Ormerod's garden at St. Albans during the years 1899–1900.

\* The word "disease" is used throughout the paper as being more convenient, but it will of course be remembered that it is a *pest* which is being considered. The term is, however, just as applicable in this case as in "mange" or other so-called "skin diseases" in animals, caused by allied species of *Acar*.

† *Recent Investigations on the Currant Bud-Mite*. R. Newstead. London: E. W. Allen, 4 Ave Maria Lane.

By far the most important experiments with this disease were conducted on his Grace the Duke of Bedford's fruit farm at Ridgmont, under



FIG. 157 B.—DISEASED BRANCH OF  
BLACK CURRANT.

FIG. 157 A.—HEALTHY BRANCH OF  
BLACK CURRANT.

Both natural size, from a photograph.

the direction of Mr. Spencer Pickering, F.R.S., and the manager, Mr. Lewis Castle, while the microscopical investigations were kindly placed in my hands for report. The experiments were begun in December, 1897.

and are still being carried on ; but the result up to 1900 has been published in the "Second Report of the Woburn Experimental Fruit Farm" \* (pp. 7-84), which should be in the hands of all who are interested in this matter.

In the Journal of the South-Eastern Agricultural College, Wye, Kent, is a preliminary report by Mr. H. H. Cousins on some experiments on the fumigation of infested Currants with hydrocyanic acid, a treatment which has of recent years found much favour as an insect destroyer.†

In treating of the efficiency of various suggested remedies, I shall have occasion to refer to the works mentioned above, with due acknowledgment to their authors ; but in other respects I shall confine my remarks to my own observations.

*Appearance of the Diseased Buds.*—The difference between a healthy



B

FIG. 158.—SECTION THROUGH A HEALTHY BUD  $\times 6$ .  
From a photograph.



C

FIG. 159.—SECTION THROUGH AN INFESTED BUD  $\times 6$ .  
From a photograph.

branch of Black Currant and one which is diseased is clearly shown in the accompanying photograph (fig. 157 A, B). At "A" is a typical healthy branch, and at "B" one which is badly infested with mites. In the former the buds are comparatively small and pointed ; while the buds of the latter are much swollen and rounded, and usually from two to four times larger than those which are free from mites. If a longitudinal section of the buds be made, it will be seen that in the healthy ones (fig. 158) the embryo leaves, forming the outer layer, are regularly placed, and hermetically close the apex ; while the corresponding leaves in the diseased bud (fig. 159)

\* *Second Report of the Woburn Experimental Fruit Farm*, 1900. His Grace the Duke of Bedford and Spencer U. Pickering, F.R.S. London : Eyre & Spottiswoode.

† This report will be found on page 308 following. See also *R.H.S. Journal*, vol. xxiii. p. 346.

are much more twisted and contorted, and, moreover, the tissues are much swollen, and the apex, as a rule, *is not closed*.

Any one making an examination of the interior of a Currant bud, whether healthy or diseased, cannot fail to notice the numerous golden-coloured fragrant oil glands, which, together with the white woolly hairs, almost cover the inner embryo leaves, more especially those at the apex of the bud. It has been stated by the Board of Agriculture,\* and I have elsewhere called attention to the matter,† that these glands are made by the mites. This is a great mistake, as may easily be proved by making an examination of a healthy bud. As to whether the mites feed upon these is quite another question—possibly they do. It is very certain, however, that they do not make them.

*Cause of the Diseased Buds.*—This is entirely due to the presence of hordes of invisible mites, which set up a constant irritation, and cause a diversion of the leaf tissues or cell structures, probably aided by the secretion of an acid which may facilitate the abnormal growths. Buds so attacked and distorted rarely, if ever, produce either fruit or wood; hence the loss on fruit is a very great and serious one.

*Description of the Mite* (figs. 160 and 161.)—It is semi-opaque glassy white, narrowly elongate and cylindrical, slightly and gradually narrowed towards the posterior extremity, and more suddenly so at the anterior extremity, which latter is provided with two pairs of legs, and on the dorsal surface above them is a long stout spine. The tarsus, or foot, is provided with a double claw, the uppermost being blunt and much the longer; the lower claw being furnished with apparently four pairs of bristles, four springing at right angles from either side of the claw (fig. 160A). The articulations of the legs are apparently well marked, but owing to several constrictions it is difficult to fix the exact position of tarsal and tibio-tarsal joints with any amount of certainty. The body is curiously made up of a number of transverse rings, numbering about sixty or seventy, which are closely and regularly set with minute tubercular processes or granular projections, both above and below. Five pairs of bristle-like hairs extend from the body—the smallest, being exceedingly fine, are placed just below the insertion of the posterior legs; the second, midway between them and the third pair, which latter are the second longest; fourth pair, towards the anal extremity, are about the same length as the second; fifth pair, at the anal extremity, much the longest. The extremity of the body immediately below the anal setæ is composed of a thin and somewhat reniform appendage (fig. 161), which acts as an anal clasper or sucker by which the mite attaches itself to the surface of its food-plant, and aided by the long anal setæ can move the rest of its body freely in any direction away from the sides of its habitat. I have seen an individual while in such a position support eleven of its companions, all of which had anchored themselves to its body by their anal claspers, but their presence did not appear in any way to impede its movements; nor did I see any of them relinquish their hold, which evidently shows they

\* Pamphlet A <sup>1-98</sup><sub>1</sub>, February, 1893.

† Newstead, *Recent Investigations of the Currant Bud-Mite*, p. 4

can attach themselves very firmly to an object, and moreover that their strength must be comparatively great.

The epidermis or skin, like that of true insects, is composed of chitine, and, although apparently so delicate, will resist the action of a 10 per cent. solution of boiling caustic potash for several minutes, and it takes from 10 to 20 seconds' exposure 6 inches from a good coal fire to destroy its form.

The actual length of a single mite is about  $\cdot 20 - \cdot 23$  mm., which means that it would take about 120 of them placed end to end to make a lineal inch.

This species of mite is not a true insect, but belongs to the order Acarina, which includes in it the red spiders and cheese mites, the parasitic mites of the mammalia, wild bees, and beetles, &c., but is distinguishable from all these, both in the immature or nymphal forms and in the adults, by the elongate form of the body and the possession of only two pairs of legs, and as such constitute the family Phytoidæ. Several species

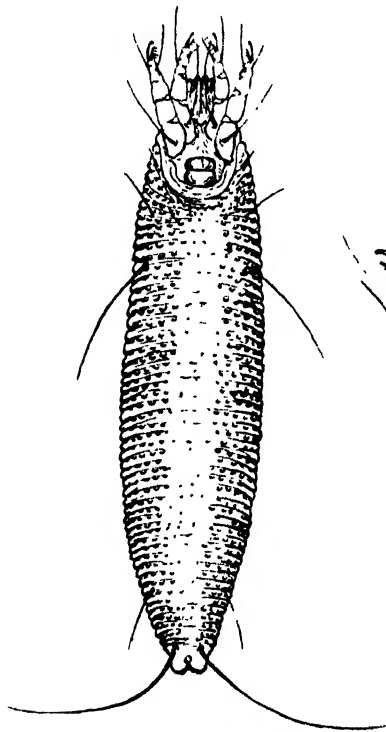


FIG. 160.—VENTRAL VIEW OF *Phytoptus ribis*  $\times 350$ .

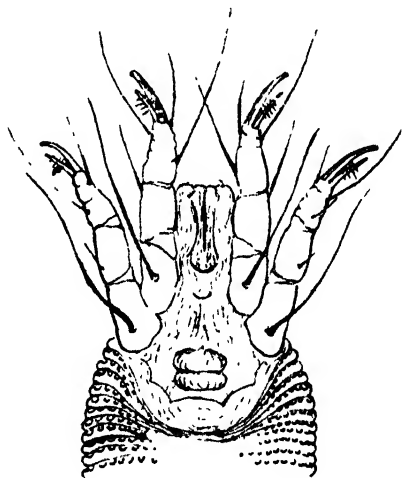


FIG. 160A. HEAD OF THE SAME, MORE HIGHLY MAGNIFIED.  $\times 5$ .

of the family are met with in this country; those most familiar to the horticulturist being the Hazel gall-mite (*Phytoptus avellane*) and the Pear-leaf blister-mite (*P. pyri*). The Lime and certain species of Acer and the common Yew have also species peculiar to them; but all these, as is generally known, do not confine their attacks to the buds as in the case of *P. ribis*.

*Habits and Life History.*—The following observations made during every month of the year are the result of constant and repeated examina-

tion of hundreds of Currant buds, branches, and roots, and also portions of the soil surrounding the latter, which, I think, for convenience of reference, it may be well to tabulate under the months during which the examinations were conducted.

#### NOVEMBER, DECEMBER, AND JANUARY.

*Mites*.—Always found within the buds, the greatest number being usually towards the centre. I have never met with them under the outer scale leaves, nor have I been able to discover any upon the bark, or on the roots, or in the soil surrounding the latter.

*Eggs*.—Comparatively few observed.

#### FEBRUARY.

*Mites*.—Under same conditions as observed in previous months.

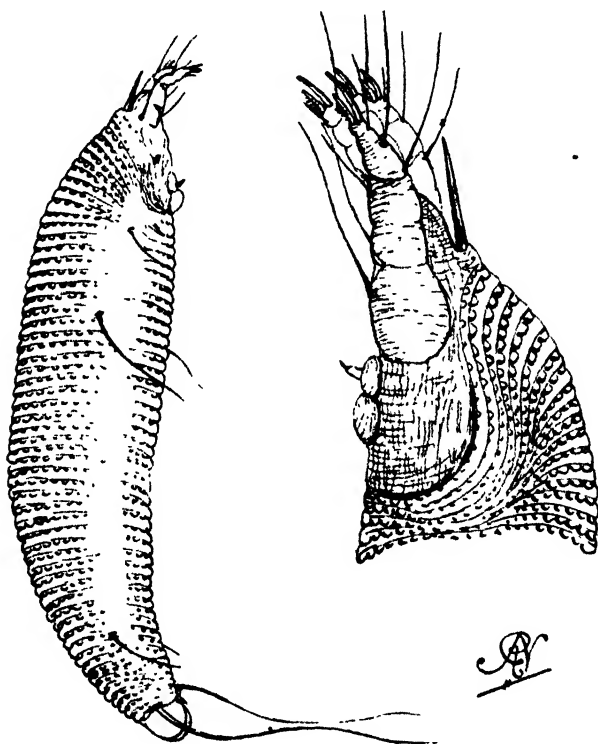


FIG. 161.—PROFILE VIEW OF *Phytoptus ribis*  $\times 350$ .

FIG. 161A.—HEAD OF THE SAME, MORE HIGHLY MAGNIFIED.

*Eggs*.—In 1898, on the 20th, and again in 1900, on the 16th of the month, I found a marked increase in the number of eggs. In examples recently received from Toddington (February 9, 1901) I found a greater number of eggs than on any previous occasion at this period of the year. They almost equalled the mites in number.

#### MARCH.

*Mites*.—Under the same conditions, in the *diseased* buds, as noted in the previous months, but greatly increased in numbers. In addition to

these I discovered, for the first time, a single mite (*P. ribis*) actively walking among the flowers. This was in 1893, on the 22nd of the month. This specimen had the extremities of the body reddish-brown with a paler centre, showing a marked contrast in colour with those found inhabiting the interior of the buds. I have never since succeeded in finding another example of this form, but have found type forms wandering over the leaves at other times.

*Eggs*.—On March 22, 1898, I found considerably more eggs than mites in certain buds from Woburn.

#### APRIL.

*Mites*.—About the beginning of the month they seem to reach their maximum in numbers. On the 19th, in 1893, and on the 25th of the month, in 1898, I observed a number of buds from Chester and Woburn respectively had become black and dried up. In these buds there were no trace of living mites, but thousands of their dead white and partly desiccated bodies covered the surface of the dead leaves in the interior of the buds. But I found no dead mites in any of the buds which were living. On April 22, 1898, I also found several examples on the young leaves. They were active, but of the typical form and colour.

*Eggs*.—Present in considerable numbers.

#### MAY.

*Mites*.—On the 19th, in 1893, I made the following observation: Examined fifty of the old infested buds which had been sent to me from High Legh, Cheshire, by my friend, Mr. A. T. Gillanders. Ninety per cent. of these buds were dead and dry—a few only having their basal portions with any life in them. In the latter were many mites which, judging from their condition, had but recently died, as they still retained their form and colour as in life. Those buds which had quite dried up gave the same results as stated in the previous month. No mites could be found on any other part of the infested bushes, viz. in the newly formed buds, behind the leaf-stalks, the leaves, or the bark.

*Eggs*.—As observed in April.

#### JUNE.

*Mites*.—At the beginning of the month very few of the old diseased buds were found to retain any vitality; but those of them which did were swarming with living mites.

On the 2nd of the month, in 1893, I noted the newly formed shoots had begun to harden, and the basal buds had then attained a length of 2.50–3 mm. long, but only just protruded from the base of the leaf-stalk. Between the latter and the buds at the ends of the young shoots I found adult mites and nymphs, but no eggs.

*Eggs*.—Present in the old buds.

#### JULY.

*Mites*.—Still found living in the old buds retaining vitality as noted in the previous month.

On the 27th of the month, in 1893, I, for the first time, found a few mites inside the newly formed buds. Again, in 1899, on the 18th, I found

them located within the apical buds on branches sent to me from Woburn, and, strange to say, the branches were from bushes which had previously received a monthly dressing of kerosene, naphtha, and formaldehyde.

*Eggs*.—Present in newly formed buds.

#### AUGUST.

*Mites*.—On the 18th, in 1898, I found a marked increase in number in the newly formed buds. No trace of them in the old buds, which had quite dried up, or elsewhere upon the foliage, &c.

*Eggs*.—Present in newly formed buds.

#### SEPTEMBER.

*Mites*.—During the second and third week of this month, both in 1898 and again in 1899, I found the mites present in the majority of the new buds, some of which, and more especially the terminal ones, were showing unmistakable evidence of the disease.

*Eggs*.—As noted in two previous months.

#### OCTOBER.

*Mites*.—In 1899 I noted that the mites were much more numerous than I had ever before seen them at a corresponding period of the year.

*Eggs*.—Present, but comparatively scarce.

*Summary*.—That the first appearance of mites within the newly formed buds was about the second and third week in July; previous to this date they were found located behind the leaf stalks. Tracing them onwards through the months which follow we find them steadily increasing in numbers, the maximum number being reached in March and April.

From this time onwards the death rate is simply enormous. As the diseased buds die, the mites die with them, comparatively few *appear* to leave them and ascend to the newly formed buds. I have only twice observed the mites migrating. In the first instance in March 1898, and again in the middle of April 1898. This alone gives a period of about four weeks, and how much longer they continue their migrations in this country has yet to be proved. It seems to me, however, that as the mites continue to inhabit the old buds up to the beginning of July, it is only reasonable to infer that the migrations would extend to that date, which practically covers a period of five months.\*

The number of mites tenanted a single bud would vary according to the time of year. By desire of Mr. Spencer Pickering, I last year (January 9, 1900) selected a medium-sized bud-gall, and in it counted 2,748 individuals; allowing for many individuals destroyed in dissecting the bud, I should put the number in round figures at 8,000. Larger buds

\* Miss Ormerod (quoting from Dr. Nalepa's work) says in the latter part of summer and in autumn the mites leave the galls in multitudes to take possession of their winter quarters—that is, the buds. "This emigration also is of frequent occurrence when the previously inhabited buds dry up."—*Handbook of Orchard and Bush Fruit Insects*, p. 62.

would contain considerably more, and in March it would be safe to add half as many again.

I think the facts which have just been stated with regard to the life-history of this pest clearly show us that the most suitable time to apply a remedy for the disease would be during the winter months, or, in other words, from the fall of the leaf to the beginning of February, when, so far as we know at present, every mite is hidden away in the interior of the buds and the eggs are comparatively few in number. Of course this habit adds much to the difficulty of the treatment, and, with the exception of hot water and hydrocyanic acid gas, nothing has yet been discovered which will kill the mites without also at the same time seriously injuring or completely destroying the tree.

*Kinds of Currants Attacked.*—All varieties of the Black Currants (*Ribes nigrum*, Lin.) are attacked, and if any preference is shown for one variety more than another it is the Baldwin. Miss Ormerod\* also gives the Red Currant (*R. rubrum*) and the "Tasteless Mountain Currant" (*R. alpinum*) as additional food plants; but, I believe, these plants have not been found infested in this country. I certainly have never met with the disease on Red Currant, although I have been informed that it does occur with us on this species of *Ribes*.

*Natural Enemies.*—I have found the larvæ of the Lacewing Fly (*Chrysopa* sp.) and also a species of Hover Fly (*Syrphus* sp.) in the semi-open gall-buds. It is well known that these larvæ prey upon Aphides, &c., but whether they were feeding upon the *Phytopti* I was not able to ascertain. I have also found the gall-buds tenanted by other species of *Acari*, and a number of Thrips, as I have elsewhere mentioned,† and in a number of buds from Toddington I have recently found numbers of a species of *Tylenchus*.

#### THE EFFICIENCY OF VARIOUS REMEDIES GENERALLY ADOPTED.

*Removal of Infested Buds.*—The experiments at Woburn‡ and also those at Toddington§ have clearly demonstrated the result of this method of dealing with this disease in large plantations. As regards the former, the Report (pp. 11, 12 *l.c.*) states that: "In 1896 the Baldwins showed signs of being attacked by the mite, and all the bushes were carefully examined, and all the galls removed. In spite of this, however, the infestation had increased to a marked extent in the following year, and had spread in certain degree to the Black Naples. The galls were again removed in 1897, but a still further increase in the severity of the attack was noticed in 1898. Such observations must throw considerable doubt on the removal of the galls as a remedial measure, though it is frequently advocated. It might, it is true, succeed when assiduously followed in a very small plantation, but when attempted on a larger scale it seems to have but little effect. . . . As further evidence we may cite the following cases, in which we selected five bushes of Baldwins, and counted the

\* *Report of Observations of Injurious Insects*, 1897, pp. 144, 145.

† Newstead, *Recent Investigations on the Currant Bud-Mite*, p. 8.

‡ *Second Report of the Woburn Experimental Fruit Farm*, 1900, pp. 11, 12.

§ Ormerod, *Report of Observations of Injurious Insects during the Year 1897*, p. 150.

number of affected buds on them in January of 1898, of 1899, and of 1900 respectively, the affected buds having been removed before growth in each year named." The data were as follows :—

	1898	1899	1900
Bush No. 1 ... ..	13	26	369
" No. 2 ... ..	134	236	1,550
" No. 3 ... ..	68	267	1,298
" No. 4 ... ..	286	620	1,796
" No. 5 ... ..	432	648	1,862
Total ... ..	933	1,797	6,875

Thus, in spite of the affected buds having been removed each year, the number of buds affected at the end of the season has been doubled in one case and increased fourfold in the other. There appears, therefore, to be no prospect of checking an attack in this manner. Personally I have twice inspected the bushes upon which the above observations were made, and can only add that they were as badly infested as those which had not been so treated.

With regard to the results obtained by Mr. C. D. Wise (manager of the Toddington Fruit Grounds, Winchcombe, Gloucestershire), I quote Miss Ormerod (p. 150 *l.c.*) who says: "Where we have picked the gall mites off last autumn the attack seems to be quite as bad this spring." Having such practical, and at the same time indisputable, evidence before us, there can be no doubt that hand-picking on large plantations is practically of little or no effect.

Hand-picking small isolated plots of Currants has, so far as my experience goes, met with a fair amount of success, and in support of this I may mention one instance where this treatment has succeeded in keeping the pest in check. In 1898, when much was said and done in this county in reference to this pest, I made an inspection of about two dozen bushes which were planted in a single row, and found that they were partially infested with the mite. My advice was to have the buds hand-picked, which was carried out, the treatment being adopted each successive year. My last inspection of these bushes was in 1900, when I found them practically in the same condition as when I first visited them, the diseased buds being present in about the same numbers. Apart from the gall-buds the bushes were otherwise in a healthy condition, and had borne fair crops of fruit. I now think, in the light of what has been observed at Woburn, that it is probable that the isolated condition of the bushes may also have helped to check the increase of the pest. I should not, however, be surprised to hear that quite the contrary has happened in other places, as the mites appear most erratic in their behaviour. I have more than once observed them in certain localities where they have only attacked, here and there, an isolated bush among a number of others, and for some unaccountable reason they did not appear to increase in numbers to any marked degree. The same retarded progress I have also witnessed where the bushes were overshadowed by larger trees, and had consequently been

unduly robbed of root moisture. We know for certain that where the mites thrive most, and the disease is at its worst, is where the bushes are planted in extensive plots, receive the best cultivation, and as a consequence make the most vigorous growths.

*Cutting down Bushes to the Ground.*—Years ago I firmly believed this method to be the most effectual way of dealing with this pest. But since seeing the recent results at Woburn, I must admit that this treatment has given anything but satisfactory results. The partial cutting down of an infected plantation has proved absolutely of no avail, as the new growths became equally badly infested, and sometimes even worse than those which had been previously cut away.

*Hard Pruning or Thinning of the Bushes* appears in no way to check the disease in large plantations.

*Cutting down Bushes, and steeping the Roots and Crows in Dilute Methylated Spirit.*—The plan adopted at Woburn (p. 23 *l.c.*) was to cut down twelve bushes from infested plots and transplant them to Harpenden, leaving the earth still attached to the roots, twelve other bushes being also cut down and soaked in dilute methylated spirit. A similar number of plants were treated precisely in the same way and transplanted to Miss Ormerod's garden at St. Albans. The following year (November, 1899) Miss Ormerod kindly gave me the opportunity of inspecting these bushes. I could not then see the slightest trace of external signs of the disease, nor could I find any of the mites in a number of buds which I subjected to a thorough microscopical examination. This treatment, therefore, gave very promising results, and I thought we had at least proved the mites were exclusively confined to the buds and did not exist elsewhere upon the plant or in the soil. Twelve months afterwards I was again favoured with another opportunity of inspecting the bushes at St. Albans, when to my regret I found a few of the buds showed unmistakable signs of the disease, and a microscopical examination showed them to be infested with mites. This does not, however, exclusively prove that the mites exist *normally* in the soil or on the roots. It is highly probable that the mites were forcibly ejected from the buds when the bushes were cut down, and that they were carried in the soil adhering to the roots of the plants which had not been treated with methylated spirit. Miss Ormerod has kindly forwarded these plants to me, and I have had them transplanted to my garden here for further investigation. I should add that I have also examined the roots and adhering soil for a possible chance of finding the mites there, but can find no trace of them.

*Liquid Insecticides.*—From what I have seen at Woburn and also from certain experiments which I have personally conducted, I believe there is no liquid insecticide at present known which will effectually kill the mites without, at the same time, also killing the bushes. It would be well if every grower of Black Currants would read the Woburn Report and see for himself the results which have been obtained there by the application of many different agents, including those recommended by the Board of Agriculture. If the mites would only expose themselves for a definite period it would be a comparatively easy matter to find a remedy. But seeing that the majority of the mites, *even at the period of migration*, are well concealed within the buds, we have yet to find a material sufficiently

mobile to penetrate the buds without injury to the plants. Hot water, at a low temperature, and hydrocyanic acid gas will kill the mites, but these latter will be treated of separately, as they scarcely come under the above heading.

*Immersion of Branches in Hot Water.*—I find that the immersion of the diseased branches in hot water for various lengths of time at certain given temperatures is undoubtedly fatal to the mites. And in order to ascertain the lowest temperature at which the mites could be killed, I made a series of experiments descending from the boiling point (212° F.) to 115°. The result is given in the tables which follow :—

Table I.—IMMERSION OF BLACK CURRANT BRANCHES INFESTED WITH PHYTOPTUS RIBIS IN HOT WATER.

Temperature	Time of Immersion	Results
212°	1 sec.	No mites killed.
"	5 "	" " "
"	10 "	All mites killed, form destroyed.
175°	10 "	Many mites living.
"	30 "	All mites killed, form destroyed.
170°	60 "	" " " " "
165°	5 "	Mites all living.
"	10 "	Mites in centre of bud living.
160°	30 "	Mites all dead, form retained.
"	60 "	Mites all dead, form destroyed.
150°	5 "	Mites all living.
"	10 "	" " "
"	30 "	Mites all dead, form retained.
145°	60 "	" " " " "
140°	30 "	" " " " "
"	60 "	" " " " "
135°	60 "	" " " " "
130°	30 "	Mites all living.
"	1 min.	Mites all dead, form retained.
"	2 "	Mites all dead, forms of many retained
120°	1 "	Mites all living.
"	2 "	" " "
115°	1 "	" " "
"	2 "	Many mites killed.
"	5 "	Mites all killed, form retained.

In nearly all those instances where the mites "retained their form" but showed no signs of life the branches were set aside for future examinations, which were made on the fifth and fourteenth days after immersion. The result is given in Table II. :—

Table II.—FURTHER EXAMINATION OF SPECIMENS TREATED UNDER TABLE I.

Temperature	Time of immersion	Condition of the mites on the 5th day after immersion	Condition of the mites on the 14th day after immersion
140° F.	1 min.	Mites still retaining their form	Dried up
135°	1 "	" " "	Mites still retaining their form
130°	2 "	" " "	" " "
130°	1 "	" " "	" " "
115°	5 "	" " "	" " "

It will be seen that in five instances the mites did not show any signs of life on the fourteenth day after the immersion, when, with one excep-

tion, they still retained their form as in life. On subsequent examinations I found the mites did not shrivel up until the buds began to dry. The immersion at the lowest temperature of  $115^{\circ}$  F. for five minutes would, I think, be a safe one, and would not injure the plants. Some foliage (Pear and Plum) will stand a temperature of  $130^{\circ}$  without apparent injury. I fear, however, that although this method has met with perfect success in the laboratory, it would be impossible to carry it out on a large scale in the field. In the first place the plants would require to be lifted and the branches *soaked* in the water (syringing would not be effectual); and secondly, I believe it to be impossible to maintain the requisite temperature with any degree of success. It is possible, however, that this method may be found of service in treating small bushes of doubtful character. Mr. C. D. Wise, the manager of the Toddington Fruit Company, has recently given this method a trial on a larger scale; and I find on examining the buds that the mites were all apparently killed, but whether the eggs also were destroyed it is not yet possible to say. No definite results can be obtained until towards the end of the year.

*Gas Treatment.*—The first experiment in this country with hydrocyanic acid on this pest was conducted at Woburn,\* the method adopted being practically the same as that employed in other countries for the destruction of scale insects, &c. (see "Injurious Scale Insects of the British Isles," Newstead. JOURNAL R.H.S., vol. xxiii. p. 255, 1900). The materials required are cyanide of potassium, sulphuric acid, and water. The gas is generated by pouring the dilute sulphuric acid upon the cyanide, which must be previously placed in a glazed earthenware vessel of some kind. At Woburn the gas was confined by placing a box, covered with tarred felt, over the growing plant; the proportions used being 1 ounce of potassium cyanide, 1 ounce of sulphuric acid diluted with 2 ounces of water, to every 150 cubic feet of space. This treatment proved a complete failure, as the plants were afterwards found to be as badly infested as before.

In the "Journal of the South-Eastern Agricultural College, Wye, Kent" (see p. 303 following) is a preliminary report, by Mr. H. H. Cousins, on the fumigation with hydrocyanic acid for the Black Currant Mite, two thousand diseased bushes being treated as follows:—"The bushes were tied in bundles and placed in a heap on the ground. Four hurdles were arranged as a support, and the whole covered with a waterproof cloth. A small vessel was placed on the ground in the centre of the heap of bushes. One hundred cubic centimetres of water (about 4 oz.) were added, followed by an equal volume of strong sulphuric acid. Thirty-six grammes (about  $1\frac{1}{4}$  oz.) of commercial 98 per cent. potassium cyanide was wrapped in thin blotting paper, and dropped cautiously into the vessel of acid. The hand was at once withdrawn; the canvas carefully pressed down all round with lengths of timber. After one hour the cloth was removed and the operation was complete." Mr. Cousins further states: "A careful microscopic examination failed to show a single living mite. All were dead." With regard to the "treatment of established bushes," he goes on to say: "We have had successful results with large

\* *Report*, 1900.

bushes planted out in the field. Forty minutes of 0.15 gramme to 0.2 gramme cyanide per cubic foot was effectual in destroying every mite in large bushes severely infested with the pest. . . . The months of December and January appear to be the best months for fumigation, owing to the absence of eggs at the season." The discrepancies between the results obtained at Woburn and Wye are therefore most marked. I should add that we have yet to learn from Wye what effect the gas has had upon the eggs, as I have had abundant proof that these do occur in December and January in spite of what has been said to the contrary, and unless these were killed by the same treatment we must expect a recurrence of the disease. Moreover I believe, from a report which appeared in the *Standard* for May 1, 1900, that the experiment on the large growing bushes was not an established success.\*

Further experiments with the hydrocyanic acid gas have recently been carried out both at Woburn and at Wye. And Mr. Wise is also giving the treatment a trial at Toddington. The results at Woburn and Toddington have, so far, proved successful, but nothing definite can be known with regard to the ultimate success of the treatment until the season has advanced.

The following rules should be observed with regard to the gas treatment of infected bushes, which, in the main, apply equally to any other method which may be adopted:—

(1) Cyanide of potassium is a deadly poison and should only be used by a responsible person.

(2) If a few plants only are to be experimented on, they should be removed from the soil and treated in an air-tight chamber, or as recommended in the Wye College Report (see p. 303). Immediately afterwards they should be removed and transplanted to a distance of not less than half a mile from the infected area.

(3) The application of gas to a selected number of plants in an infected plot would prove absolutely useless. When the treatment is to be adopted on a large plot of growing plants every plant in the plot should receive uniform treatment throughout.

(4) Make the application at least twice—the first about the end of January, the second fourteen to twenty days later.

As to the methods of prevention, these consist of—

(1) A clean healthy stock to begin with.

(2) Planting in single rows between other crops, or in small isolated plots.

(3) Prune so as to admit plenty of light and air.

(4) Above all, keep an ever watchful eye for the first signs of the disease, and burn the first bushes which show the least sign of it.

In conclusion I beg to tender my sincere thanks to Miss Ormerod, LL.D., to Mr. Spencer Pickering, F.R.S., Director of his Grace the Duke of Bedford's fruit farm at Woburn, and also to Mr. Lewis Castle, the Manager, for giving me the valued opportunity of helping in the Woburn

\* Mr. E. J. Lewis, Agricultural College, Wye, informs me, "The bushes were as bad as ever in the following autumn." *In lit.* 6, ii. 1900.

experiments, and for courtesies at all times extended to me on my visits to them. I am also indebted to Mr. C. D. Wise for giving me an opportunity of examining buds from the plants under treatment at Toddington.

To the Council of the Royal Horticultural Society I also tender my sincere thanks for giving me the opportunity of placing this report before the Fellows of the Society; and may I add that, if hereafter I should have fresh matter to communicate on this important subject, I trust the Council will permit me to do so?

Of the illustrations, figs. 158 and 159 are from micro-photographs kindly supplied by Mr. A. E. Goodman, to whom I am considerably indebted for the pains he has taken in preparing them. The remaining illustrations are my own productions.

#### DISCUSSION.

The Rev. Professor HENSLow, V.M.H., enquired as to what steps had been taken to ascertain how the mites migrated from one garden to another, or even from bush to bush when not in contact. Until 1897 he had never noticed the diseased buds in his garden at Ealing, never having had any deficiency of fruit, but in 1897 the bushes were badly infested. The garden was quite isolated.

Mr. CASTLE, manager of the Duke of Bedford's experimental Fruit Farm, said: Mr. Newstead has treated this matter so fully, and it is dealt with so exhaustively in the Reports to which he has referred, that there is little room for further remarks upon the subject. I should like, however, to say a few words upon the methods adopted in the application of the various substances.

For many years I have been impressed with the importance of discovering some means of preventing or reducing the attacks of the Phytoptus if the Black Currant crop is to be of any service to fruit-growers in this country. Within my memory and experience I should say the number of attacked plants has increased ten times, and a proportionate increase would in a few years render the Black Currant almost valueless from a commercial point of view. I have tried many supposed remedies, with the varied and uncertain results which come from partial attempts of this kind; it was therefore a source of considerable satisfaction to me when the experiments at the Woburn Fruit Farm on a well-organised basis came under my charge. I had high hopes that some really practicable means of destroying the pest would be found, and suggested everything that experience had taught me as likely to bring about the desired result. Those hopes have not been realised, and we have still to find a way of escape from the danger which threatens an important crop.

The best devised experiments are useless if they are not carried out with the utmost care. Realising this to the fullest extent, the whole of the substances and mixtures employed in the Woburn experiments were prepared by myself, and the application was made in every case under my own superintendence and with my personal assistance. I can therefore answer for it that all the details given in the Report were carried out to the letter. Beyond this, considerable care was exercised in selecting

the time for the applications: either calm dull weather was chosen if the dressings were applied in the day time, or the work was done in the evening. The object being to give every substance the opportunity to exert its fullest influence, every mixture or solution was prepared fresh for each application, and in most cases where it was practicable the bushes were twice sprayed or dressed to ensure no part being missed.

From observations extending over many years, in which it had become evident that some varieties of the Black Currant were more badly and frequently attacked than others, I had thought that it might be possible to secure a race that would be exempt from attack. For ten years I had a fine selection of the Old Black growing in a garden surrounded by other gardens where the Bud Mite was well known, yet these plants were never attacked. In 1895 I obtained cuttings from these, which were rooted at the Woburn Experimental Fruit Farm, and until the present year they have remained quite free from attack; but it must be admitted that they have an isolated position near a hedge, though they are in a line with the worst infested plants and in the direction of the prevailing south-west winds. It seemed probable that by going back to the earlier varieties, or perhaps crossing with some wild types, some good results might be secured. Whether that be so or not yet remains to be proved, but the raising of seedlings without artificial crossing has not proved satisfactory, a large proportion being infested in the second or third year.

There is also the possibility that grafting on some suitable stock might produce an alteration in the character of the plant; but it is doubtful if that could be carried out on a large scale with profit, even if it proved effectual against the enemy.

However, there is plenty of room for further experiments and extended observations, and it is only by such means that the difficulty will be overcome. At present the most promising method seems to be the use of cyanide of potassium gas, but if the employment of liquids on plants out of doors to serve as insect destroyers is fraught with many difficulties, the use of gas for the same purpose is still more uncertain. The hydrocyanic acid gas is undoubtedly a most destructive agent, but to ensure its surrounding the buds sufficiently closely to penetrate to the whole of the mites *and their eggs* is not an easy matter. Still it deserves further trial.

The Rev. W. WILKS: As Mr. Newstead has remarked that possibly hand-picking of the swollen buds may be effective in small plantations, I should like to add my experience to the general store. In the late autumn of 1896 I planted twenty-four small bushes, and having already heard of this horrible mite I examined all the little plants as they were put into the ground and found two swollen buds, which I picked off and threw in the fire. The next year, 1897, though I searched diligently (but not microscopically) I could not find one single swollen bud, and I thought and hoped I should be free from the pest. Alack! in 1898 there were a great number of swollen buds. That none should escape, I myself went carefully three times over all the bushes, removing every bud that showed any sign of rotundity. The result was distinctly encouraging, for in 1899, search as I would, I only found three swollen buds, and again I hoped. Alack, alack! this autumn (1900) it already looks as if almost every bud on every bush would be full of mites—full to bursting—and I have now

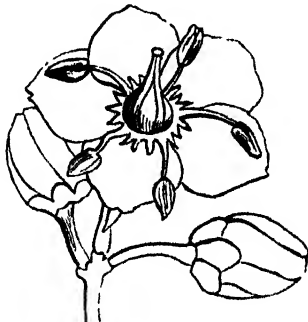
abandoned every shred of hope that even in the smallest plantations hand-picking will avail.

One other remark I should like to make, or rather to ask two no doubt very ignorant questions. First, is it quite certain that a different host-plant may not carry the pest over a different life stage? Is it impossible for the (at least very closely allied) *Phytoptus* which attacks the buds of nuts—is it impossible for it to pass over to the Black Currant, at the same time slightly modifying its bodily structure, if needs be, to suit its new environment? I have been told that entomologists will not entertain the idea for a moment because of two additional bristles which the Currant Mite has more than the Nut Mite. But if that be the case, how do they account for any development? May they not have here, actually under their eyes, a case of development to suit an altered food-plant? And my second question is this: Is it impossible for the creature, in some elementary stage of its existence, to pass with the sap through the vessels and tubes conveying this liquid from the root to the bud—somewhat in the same way as the *Trichinæ* we used to hear so much about were said to pass from the food eaten into the muscles of the arms and legs of the eater?

Mr. NEWSTEAD explained that the migration of *Phytoptus* from one district to another would be quite involuntary. Strong winds may take them bodily from place to place, and very probably birds and winged insects may also carry them considerable distances. The spread of the pest is, however, chiefly due to the transportation by infested nursery stock, and the propagation of infested cuttings.

He also thought it possible that the infestation of Professor Henslow's bushes at Ealing may have been present prior to 1897, as he had observed instances where *Phytoptus* had existed in comparatively small numbers for several years without in any way affecting the crop of fruit.

In reply to the Rev. W. Wilks Mr. Newstead said that, so far as had been at present ascertained, no knowledge of the alternation of generation existed in *P. ribis* or any other allied species of *Phytoptus*; and, further, he considered *Phytoptus avellanæ*, infesting the buds of the Nut, to be quite distinct from *P. ribis*, and that the former species had never been known to pass from the Nut to the Currant. As to the second question, Mr. Newstead said he had, so far, failed to find a trace of any foreign organism within the tissues of the plant—i.e., in the vessels and tubes or cell structures.



## FUMIGATION WITH HYDROCYANIC ACID GAS.\*

By Mr. H. H. COUSINS.

## FOR BLACK CURRANT BUD-MITE AND MEALY BUG.

THESE two pests are widely recognised as among the most dangerous and elusive of the enemies of the greenhouse and garden. So severe have been the losses incurred by the spread of the Black Currant Mite that the industry is in a very critical state, and many hundreds of acres which once produced large and highly profitable crops have had to be "grubbed" and the culture of Black Currants abandoned. One grower recently informed us that his average returns from this crop had fallen from £1,400 a year to *nil*, owing to the terrible havoc wrought by the mite. "Mealy Bug" is a well-known and widely dreaded foe of the vinery, and few are the gardeners who have succeeded in its complete destruction without the most drastic of remedies.

"Washes" having proved of little use for these two pests, it became necessary to devise other means of attack. Reports of the great success of cyanide fumigation in America for the treatment of the San José Scale suggested a trial of this method, and the following experimental results justify a confident expectation [in regard to one of the pests, and a hope in regard to the other] that a successful means of attack has at last been found.

## 1. EXPERIMENTS ON BLACK CURRANT BUD-MITE.

The spread of the disease is clearly due, in the first place, to the propagation by cuttings from infested stock. Buds of apparently normal dimensions frequently contain a few mites capable of indefinite increase. In the case of the Baldwin Currant, it is most difficult to find a shoot free from mites even when the buds appear quite healthy.

Secondly, diseased stock undoubtedly spreads the infection by the mechanical distribution of the mites on the clothes of the men engaged in hoeing, &c., or through the agency of the wind or of birds.

Given a means of cure, this disease should be proclaimed as infectious, and every effort made to stamp it out.

Preliminary experiments indicated that at least forty minutes' exposure to the cyanide fumes was necessary to ensure the complete destruction of the mites. Shorter periods were apparently successful at a first inspection, but a further examination showed that many individuals recovered after twenty-four hours. Doses of cyanide varying from 0.05 gramme to 0.4 gramme per cubic foot were tested, and a minimum of 0.2 gramme per cubic foot was arrived at. A stronger dose than 0.3 is not called for.

*Fumigation of Cuttings and Young Bushes.*

On January 8, 2,000 diseased bushes which were intended for planting out were treated as follows:

The bushes were tied in bundles and placed in a heap on the ground.

\* Reprinted by permission from the Journal of the Agricultural College, Wye, Kent. See also R.H.S. JOURNAL, vol. xxv. p. 298.

Four hurdles were arranged as a support, and the whole covered with a waterproof cloth. A small vessel was placed on the ground in the centre of the heap of bushes. 100 cubic centimetres of water (about 4 oz.) were added, followed by an equal volume of strong sulphuric acid. 36 grammes (about 1½ oz.) of commercial 98 per cent. potassium cyanide was wrapped in thin blotting paper and dropped cautiously into the vessel of acid. The hand was at once withdrawn, the canvas carefully pressed down all round with lengths of timber. After one hour the cloth was removed and the operation was complete.

A careful microscopic examination failed to show a single living mite. All were dead. Mr. Theobald conducted a systematic microscopic analysis of the treated buds, and established the fact that this treatment had destroyed *all* the mites. Eggs were also [apparently] absent. The bushes have now been planted out in disease-free soil, and are under constant inspection. At present everything points towards a successful cure. A fortnight later a second batch of young bushes was similarly treated, and with identical results so far.

The cost of chemicals is only about a penny per thousand bushes, and the labour involved trifling. All cuttings should be fumigated before being set. Black Currants so quickly come to a good bearing size, that it would be well to grub a badly infested plantation and start afresh with sterilised young stock.

To the above report Mr. A. D. Hall, the Principal of the College, has kindly added the following :—"I am not by any means disposed at present to definitely recommend the hydrocyanic process other than by way of experiment, and until we have seen more results I should prefer to say nothing. If the process recommended be carried out in the winter, when the temperature is low and the bushes in a dormant state, no injury whatever is done to the plants. The real difficulty lies in the eggs of the mite—it seems to be always laying eggs, except perhaps in the very coldest weather ; and though we are now sure the adult mite is killed by the treatment we are still doubtful about the eggs. The treatment of large bushes *in situ* has failed on the whole."

## 2. MEALY BUG IN VINERIES AND CONSERVATORIES.

Through the kindness of Colonel Ready of Goudhurst, and Mr. Hammond of Ramsgate, we have been enabled to try the effect of cyanide fumigation under a variety of conditions. We are greatly indebted to them for permitting admittedly risky experiments with valuable vineries. Three vineries, A, B, and C, have been twice treated, as also a large conservatory. In each case the attack of Mealy Bug was severe.

### *Vinery A.*

Capacity, 3,480 cubic feet.

Early variety. Treated when vines in full bloom :

Cyanide, 18 oz. ; acid, 27 fluid oz. ; 1 quart water.

Temperature, 60 deg. F. Time, half an hour. After sunset.

*Result.*—Mealy Bug destroyed, foliage unhurt, but three-quarters of

the bloom injured. A few Mealy Bugs appeared at the close of the season, after the grapes had been gathered. A second fumigation was therefore decided upon, and the results so far have been completely satisfactory.

#### *Vinery B.*

Capacity, 3,825 cubic feet.

Late variety. Treated before vines bloomed :

Cyanide, 27 oz. ; acid, 40 oz. ; water, 60 oz.

Time, 8 hours. After sunset. Temperature, 60 deg. F.

*Result.*—Mealy Bug destroyed. No injury to vines. A few appeared in the autumn, and a second fumigation was given, with the same success as in the previous case.

#### *Vinery C.*

Capacity, 1,990 cubic feet.

Early variety. Treated when grapes the size of peas.

Cyanide, 6 oz. ; acid, 9 oz. ; water, 15 oz.

Temperature, 65 deg. F. ; weather very sultry at the time. Time, 40 minutes ; 8 A.M.

*Result.*—Grapes browned and killed. Entire crop lost. Foliage uninjured. Mealy Bug destroyed. The vinery was kept on the cool side, plenty of air given, and splendid growth and promise of fruit for next year was obtained. A few Mealy Bugs appeared in October. Fumigation was repeated. All the bugs were destroyed. The season had so far advanced, however, that eggs were to be found on the shoots. Painting the rods with the winter alkali wash in the spring and a fumigation before the bloom appears to have been decided upon.

#### *Conservatory.*

3,000 cubic feet, containing mixed flowers and ornamental plants, ferns, &c. Infested with aphids and Mealy Bug. Cyanide, 8 oz. ; acid, 12 oz. ; water, 20 oz.

Temperature, 50 deg. F. (after sunset). Time, three-quarters of an hour.

Complete success. No injury to maidenhair ferns, or any plants under treatment. Cost 1s.

#### *Greenhouse.*

2,000 cubic feet ; containing chrysanthemums in full bloom, severely infested with green fly :

Cyanide, 3½ oz. (.05 gramme per cubic foot) ; acid, 5 oz. ; water, 9 oz.

Temperature, 52 deg. F. Time, 25 minutes ; one hour before sunset.

*Result.*—Every aphid killed, also slugs, flies, wasps, butterflies. A toad was uninjured. Not a petal or leaf was injured. Cost 5d. ; 2½d. per 1,000 cubic feet.

#### *Conclusion.*

These experiments should encourage practical men to give cyanide fumigation a thorough trial for such pests as are beyond ordinary treatment. Although the cyanide fumes are poisonous in the extreme, if care be taken there is absolutely no risk to the operator. For outdoor work stand to windward when removing the waterproof cloth. If the cyanide

be wrapped in small pieces of blotting paper it is easy to drop in the required amount of cyanide without the slightest risk of breathing the fumes of prussic acid, which are evolved on contact with the acid.

For greenhouse work, proceed as follows : If the house be under 10,000 cubic feet one vessel will suffice ; if over, provide a vessel for each 10,000 cubic feet. Arrange the ventilators so that they can be opened from without.

Operate from *outside* the house by tying the cyanide in a paper packet to a string at the end of a bamboo or other pole and dropping the cyanide into the jar of acid. Always add the acid to the water and not *vice versa*.

The foliage of the plants should be *dry*. A temperature not exceeding 60 deg. F., and preferably of 50 deg. F., is requisite. Above 60 deg. F. there is risk of injury to the foliage. Fumigation must not be done in strong light, and is best carried out after sunset. Open all doors and ventilators after the prescribed time, and on no account enter the house *within one hour*.

For Mealy Bug we recommend 3 oz. cyanide ; 5 oz. acid ; 15 oz. water per 1,000 cubic feet, either before the vines bloom, or when grapes are colouring, or after the crop has been gathered. At either of these stages no harm results to either foliage or fruit. Avoid fumigation when the vines are in bloom, or before the grapes have commenced to ripen.

For ordinary greenhouse pests, such as aphid, aphid, whitefly, slugs, woodlice, red-spider, and caterpillars, a dose not exceeding  $1\frac{1}{4}$  to 2 oz. cyanide, 4 oz. acid, 7 oz. water, per 1,000 cubic feet, has proved itself satisfactory.



## IMPERIAL GARDENS FOR FRUIT-TREE DISSEMINATION THROUGHOUT THE EMPIRE.

By Dr. BONAVIA, F.R.H.S.

It is gratifying to learn that the two notable Bananas of India—or Plantains, as the English there call them—have been at last introduced into the Royal Gardens at Kew.

The *Ram Kela* and the *Champa* Bananas must have been known to the British in India for perhaps a hundred years, and yet nobody, until recently, has ever thought of introducing these fine things, either into England, or to any of our colonies.

I do not think there are many plants the stools of which—like bulbs—can be taken long distances without any special care. The Banana is such a plant.

The way it is grown in Northern India is this :—

A trench is dug, three feet deep and as many broad. The bottom of the trench is manured, and the bulbous roots, with their sprouts, planted there, four or five feet from each other. Then every year a lot of fresh cow-dung is thrown round the stems, until the trench is filled up in the course of years, when the site is changed and the same process repeated. The Banana requires plenty of water, except in rainy seasons.

In Northern India the choicest varieties cannot be cultivated, as both the hot winds and the cold winter nights are unfavourable to them. Bombay, Madras, and Bengal are the districts that suit them.

The comparatively inferior variety now so largely grown in the West Indies cannot be compared with the choicer ones of India.

It is surprising that wealthy persons in the United Kingdom have never devoted a special glass-house to the cultivation of these indubitably fine varieties of Plantain.

The introduction of these choice Bananas into England is a movement in the right direction. Eventually they can be disseminated throughout the tropical dependencies of Great Britain.

But this is not enough.

There is room for two or three Imperial Gardens, where some of the choicest fruit-trees of the world could be collected, studied, and not only disseminated throughout the Empire, but new ones evolved by seed variation and cross-fertilisation; for it is idle to suppose that all these choice fruits were originally contained in the "Garden of Eden."

Let us take them seriatim :—

### (a) ONE OR TWO GARDENS FOR THE CITRUS GENUS.

There are so many fine and distinct varieties of this wonderful genus—some of which are very little known out of the localities in which they are grown—that it would be an advantage to the people of the Empire, and also to mankind in general, to have them collected for the study of their botanical and horticultural characteristics and commercial values.

## THE PORTUGAL ORANGE GROUP.

The Portugal Orange, of which the British markets are now full, with its variations, the seedless oval Orange of Malta, and the oval Orange of Jaffa, also seedless, and the Blood Orange, &c., are sufficiently well known to need no description.

I am informed that in Malta there exists a unique Orange of the same group, but which is never sour from beginning to end, but sweet and juicy. It is called there "Loðmi-Larènj." I have never met with an Orange of this description in India. It would be worth while getting hold of it for the purpose of multiplying it and bringing it into commerce. Such a unique Orange, I believe, has never appeared in the English market.

In India I met with two varieties of this group; both are fine and worthy of being more generally known. The one is the "Bàndir" of Tanjore, a large Orange, 12 in. in girth or so, with a yellowish-orange skin when ripe. The other is the "Mussèmbi" of Poona. Its name is evidently a corruption of Mozambique, and it goes to the Bombay market. The exterior is orange-yellow, and is covered with longitudinal furrows from base to tip. Natives say this can be kept on the tree for a whole year without deteriorating.

## THE SÛNTĀRĀ GROUP OF INDIA.

The loose-skinned "Sântārā" Orange of India, as far as I know, has only appeared once in the London shops. There is a considerable trade in this Orange in India itself.

There are two widely spread varieties of it. The one is called "Nagpore" Orange, some of which find their way to Bombay. It is thus, I believe, which, on one occasion, was sent to London.

The other is the "Sylhet" Orange, which mainly goes to Calcutta, and is grown *solely* from seed.

The fruit of the two differs little, but the tree of the former has a spreading form; while that of the latter is upright, somewhat in the fashion of a Lombardy Poplar, although, of course, not so tall by any means.

There are other good varieties of this group which are little known. One is grown in Lahore, the fruit of which is distinctly pyriform (see *Oranges and Lemons of India and Ceylon*, Plate cix.). It is wrongly called 'Kārna' in Lahore. Another is the 'Jāwa-nārūn' of Ceylon, resembling a purse with a much-puckered surface.

A still more interesting variety is the green Orange of Ceylon, called there 'Kōnda-nārūn.' It is invariably eaten in its green state. Rumphius mentions an Orange which is green when quite mature, and if left on the tree till it colours becomes, he says, worthless. But in an experiment which I made with these green Oranges in 1884, I found them better flavoured and more juicy as they turned yellow.

Both the 'Jāwa-nārūn' and the green 'Kōnda-nārūn' are pictured in Miss North's Gallery at Kew, No. 266.

In Ceylon, a number of the varieties of the 'Sântārā' group are called

Mandarins, but the only true Mandarins I ever saw there were a few on a neglected tree which the late Dr. Trimen showed me in Peradeniya.

The 'Tangerines' of the London shops are no other than Mandarins.\* I never could discover one in London worth eating. To enjoy it you must grow it yourself, and take it off the tree when fully ripe. The perfume of its peel is not to be found in any other Orange.

To the 'Süntārā' group belongs a small Orange, grown almost wild on the borders of Nepal, north of Goruckpore. It is the sweetest Orange I ever came across, perhaps a little too sweet. It is locally known by the name of *Süntōlāh*.

Another important Indian Orange belongs to what I consider a subgroup of the 'Süntārā.' It goes by the name of *Kēonla* or *Kāmala*. Its exterior is of a deep lobster-red, and even when quite coloured is sourish, but if left for a long time on the tree it sweetens. It is the latest of all Indian Oranges.

The *Lāroo* of Poona is, I consider, a variety of the foregoing. It is flat and very loose skinned, so much so that the pulp-ball can be made to rattle within the skin.

I have enumerated all the Indian Oranges that could, I think, be made marketable, although there are several others.

It is not easy to find a place for an Imperial Orange Garden, where all the Orange varieties of the *Citrus* genus could be studied, for one kind of soil might not suit them all. The Mediterranean climate would probably suit all varieties, and Cyprus or Egypt might perhaps be mentioned as an eligible locality. It must be a place where water could be easily procured, and not subject to frost.

#### (b) A MANGO GARDEN.

An Imperial Garden for Mango trees of the choicest varieties, for the study, propagation, and dissemination of this noble fruit. There are at least about fifty choice varieties of this unique fruit, some of which cannot be bought, but are grown in the orchards of native gentlemen, and kept for presentation to important officials and select friends.

The Mango is the one fruit in which the native of India takes a real interest. You may mention to him many other fruits, but he will tell you "They don't come up to the Mango."

No one who has not lived some time in India, and has discovered what a choice Mango, just ripe, means, can form any adequate idea of the exquisite flavour of this fruit.

New arrivals in India, having heard of the Mango, very often get hold of seedling bazaar Mangos, and pronounce them a fine combination of tow and turpentine. They have a sort of turpentine flavour, and the inferior varieties are very stringy, and can only be sucked. Nevertheless, there are often exquisite flavours even among these.

The Mango is never allowed to ripen on the tree, but is plucked at a certain stage and packed in large jars among straw. This operation is called putting the fruit in *pāl*. The reason given for this is that the

\* Perhaps they may be a seed variety, and a little smaller than the true Mandarin.

Mango ripens more evenly and through than on the tree. In England Pears are treated in much the same way. When taken off the tree they are not fit to eat, and many kinds of Pears require to be kept a long time before they are fit to eat.

This characteristic of the Mango fruit would prove advantageous for exportation, as it would ripen on the voyage.

All the choice varieties most probably originated by seed-variation, and their good qualities are kept up by proper cultivation.

All the fine varieties are propagated by grafting them on seedlings of the ordinary ones.

The Mango tree cannot be grown successfully in localities subject to severe frost. On one occasion, in Lucknow, in the first week of January, five degrees of frost were registered. All the Poinsettias in the Horticultural Garden were, of course, killed outright; the young seedling Mango plants in the nursery prepared for grafting were killed; and up to six feet from the ground all the leaves of the large Mango trees were blackened, but above that line no leaves were touched.

In the hot dry weather the trees want regular watering.

Some place in India not subject to frost, and where water can be easily got at, and with good soil, would be suitable for a garden such as is here suggested.

There are so many exquisite varieties of Mango that they could not readily be studied, and their characteristics found out, without being collected in one garden. From thence they could be disseminated to all parts of the Empire where the climate would be likely to suit them.

I have often tried those that sometimes appear in the London shops from the West Indies and other Atlantic islands. I never found one worth eating. They would not be looked at by an Indian Mango connoisseur.

I have often wondered why wealthy English gentlemen, with extensive gardens and acres of glass-houses, have never, that I am aware of, undertaken to build a special house for the reception and growth of the trees that produce one of the finest fruits in the world.

It is the same with Oranges. The British markets are flooded with foreign Oranges, which are often unripe and sour. When ripe they are mostly stale, and not infrequently have a flavour of onions or tar. The flavour of tar is acquired from the ship-hold, and that of onions comes from a mixed cargo of oranges and onions!

To eat an Orange off the tree when perfectly ripe would be a revelation to persons who have not been in Orange countries, and the difference between those imported and those taken off the tree at the right time is something like the difference between night and day.

And yet one never hears of any wealthy gentleman undertaking to erect a special house for Oranges, and to collect these fine things which are to be found in various parts of the world.

There is such a thing as a movable glass house on rails. Such contrivances would be very useful in England, where foreign fruit trees might be kept warm under glass in winter, and the house wheeled off them in summer to expose them to direct sunlight and rain, both being very invigorating to all trees.

If the present movable house is somewhat cumbersome it could be made in sections ; and surely the engineers who have built the bridge over the Forth, and have done other wonderful things, would be equal to inventing a house that could be easily drawn away by either horse, steam, or hydraulic power.

Then I am told that the reason why Orange trees are not popular in England is that their leaves have to be washed, which is a great bother. I am afraid, however, that sufficient experiments have not been tried, with washes syringed over the leaves, to rid them of that curious sooty, powdery parasite that more or less covers them. There is the ammoniated sulphate of copper, used successfully by the French to combat mildew on vines ; there is carbolic soap, and petroleum, and other combinations that might be tried.

I must not forget, however, that I am writing about Imperial Gardens for the dissemination of fruit trees which are little known, and not about private gardens.

Where Mango trees in India can be grown, Guavas, Lichis, and Bananas can be also grown.

Of Guavas there are two forms, the globular and the pyriform. Those sold in bazaars are not choice, but they make one of the finest fruit jellies in existence. You have to eat Guava jelly, freshly made, with clotted cream, on toast, to understand what this fine thing means.

All Guavas make a capital stew—peeled, with the seeds scooped out, and stewed in sugar and a little water. They are excellent, with a *sui generis* flavour.

The raw fruits are not much relished by the English in India, owing to their strong scent ; some cannot tolerate them in a room. But there are Guavas and Guavas. The choice varieties would be worthy of cultivation in an Imperial Garden. There is one fine variety which I came across in Lucknow. It was presented to me by a native gentleman, and strange to say, it had the flavour of Strawberries ! It is curious that this flavour should be imitated by two such distinct fruits as the Grape and the Guava.

Of the Persimmon I know nothing, except what I read of it. Of the Mangosteen I know nothing from personal experience. Every one who has eaten it declares it to be a delicious fruit. I was informed that it had been introduced into the lower ranges of the Nilgiri Hills. Why they have not introduced it into Ceylon and cultivated it for commercial purposes is a mystery.

I think I have enumerated all the choice fruit trees of which I have experience, and which might be grown in Imperial Gardens for dissemination throughout suitable places in the Empire. In such gardens these trees could be studied, and the best mode of cultivating them and propagating them discovered. Moreover, it is only in such institutions that new varieties could be evolved from seed, for no private garden could possibly undertake the creation of new varieties of the fruits herein mentioned on the scale that would be required for success.

It might be said, especially with regard to Oranges—why undertake such a troublesome and expensive job, when shiploads of Oranges are already imported from various places? Well, no one will say that Apples are not grown in this country in large quantities—the bewildering number of varieties at the Shows testifies to this—yet shiploads of Apples come from Canada and the United States.

What is being done in America with regard to fruit trees should be a lesson to the rulers of the British Empire.

I have left out of consideration a large number of varieties of the Citrus tribe which are to be found in India, such as Lemons, Limes, and Citrons, &c. The latter might be utilised in India and elsewhere for making candied citron-peel. On one occasion I gave some Citrons to a lady friend, and explained to her how this preserve was made. She turned out a candied peel which was much finer than any I could obtain in the shops, and the late Mr. Philip Crowley of Waddon always had most excellent home-made citron-peel.

The number of varieties of Citron to be found in India is astonishing, as a glance at the 'Oranges and Lemons of India and Ceylon' will show.

There is one fruit which must not be omitted in this sketch. It is the red-fleshed Pummelo of Bombay. When cut across, its pulp is of the colour of raw beef, and it is the thinnest-skinned Pummelo that I ever came across. It is fine-flavoured and juicy, and when the large juice vesicles are taken out and mixed with sugar they are delicious. This Pummelo is of the size of a child's head, and sometimes of the size of a child's head affected with hydrocephalus!

I have done with these fine fruits, but there is one plant which should be grown largely in India itself—I mean the Date Palm. In Imperial Gardens experiments might be systematically undertaken with the innumerable varieties of the Date Palm which are known in Asia and Africa; about 150 at least, although not all of first-class quality. The success obtained with these trees by the Superintendent of the Saharunpore Garden proves undoubtedly that the notion that the Date tree cannot be grown successfully in India for its fruit is an antiquated superstition. India is written with five letters, but it is as large as Europe without Russia! The Date tree experiments, if undertaken, should be under the care of a practical Date grower imported from the Persian Gulf.

It is not intended in this sketch that Imperial Gardens should have anything to do with growing flower-plants and vegetables. That is already done in provincial horticultural gardens. The object should be to collect in one place, and under one supervision, as many of the choice fruit trees that can be grown in that locality, for the purpose of studying them, describing them, classifying them, and discovering the best mode of cultivating them, with the object of disseminating them throughout the Empire in suitable localities, for the health and enjoyment of the people, and for commercial purposes.

## ON A SERIOUS DISEASE IN THE CHERRY ORCHARDS OF KENT.

*(Being a Report by Mr. W. CARRUTHERS, F.R.S., made to, and reprinted by permission of the Council of the Royal Agricultural Society of England.)*

A LEAF disease of Cherries has lately been reported from several orchards in the county of Kent. In the early summer it affects the leaves and fruit simultaneously, rendering the latter unfit for market. In autumn and winter its presence is easily detected. The diseased leaves remain attached to the branches as if the tree had been killed in the full vigour of growth, just as the withered leaves remain on a branch that has been severed from the stem.

The fall of the leaf in autumn is a normal process carried out by the living leaf, which forms at the point of its attachment to the branch a cicatrix that secures when completed the easy severance of the leaf from the branch, leaving a clean scar. The speedy and fatal injury to the leaf caused by the fungus prevents the formation of this cicatrix, and the leaf remains attached to the tree.

A further striking characteristic of this disease is the shortening of the branches which bear the diseased leaves. (Fig. 162.) The internodes or joints between the leaves of these branches have not been developed. The year's growth, which should have extended to a considerable length, measures less than an inch. The crowded leaf-bases have each a healthy bud in the axil. The dwarfing of the branch is not due to any attack from a fungus, for no fungus is present in the tissues. The dwarfing is entirely due to the want of food, consequent on the early death of the leaf. That this is the case is confirmed by the fact that some of the dwarfed branches have produced in the following year vigorous normal shoots.

The leaves were not received until late in the year, when they were found to be spotted with groups of minute black fruits (perithecia) of some parasitic fungus. (Fig. 163.) A section through one of the groups shows that the proper tissue of the leaf is much disorganised, and is everywhere penetrated and destroyed by the brownish mycelium of a fungus connected with the perithecia. These perithecia are seated just below the epidermis, on both surfaces of the leaf, though they are found chiefly on the under surface. They are in some cases dead and their contents dispersed, in others there is a compact mass of colourless fungal tissue inside the dark outer skin; this may be the dormant condition of the fungus. Sections through the leaf-stalk show also a very luxuriant growth of the mycelium, which is confined to the cortical tissue. It is very irregular in form and pushes its way between the cells. It does not extend beyond the petiole, stopping short at the point where the large cortical cells of the petiole are in contact with the small round compact cells of the twig, into which the fungus does not penetrate.

The disease has been spreading rapidly in Kent during the last few

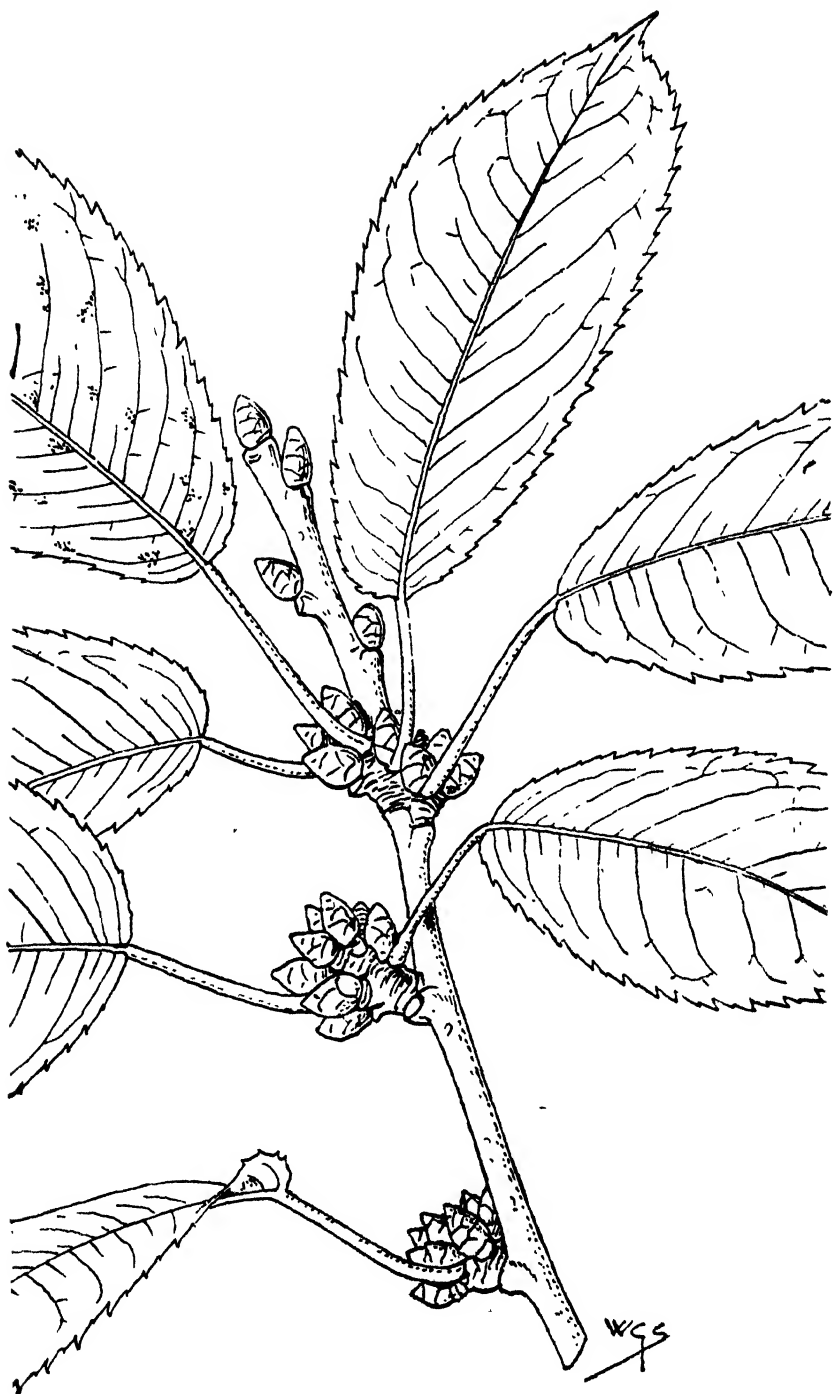


FIG. 162.—TWIG OF DISEASED CHERRY TREE.

years. The varieties of Cherry trees that have been reported as specially liable are Waterloo, Bigarreau, Frogmore, Napoleon, Blackheart, Cluster, and Elton. Turk and Governor Wood have not as yet suffered much, and English and Flemish reds and May Duke have not been attacked, though odd trees of other varieties, such as Bigarreau, growing among them have been diseased. In one orchard the disease attacked "Waterloo" first, soon spreading to other varieties, while at another place this variety had not been affected until last year, and then only the leaves had suffered, the fruit had not been damaged.

Professor Frank, of Berlin, has described, in *Gartenflora*, 1887, pp. 2 and 51, a serious injury to Cherry trees which, there is little doubt, is the same as the disease that has attacked the Cherry orchards in Kent. The malady was first observed in the Cherry orchards of the Altenland, on the

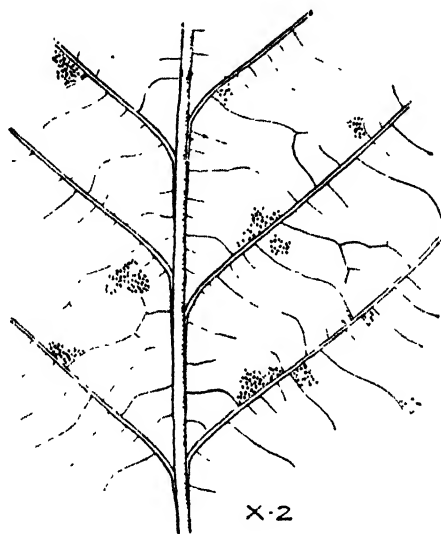


FIG. 163. FRAGMENT OF LEAF OF CHERRY TREE  
SHOWING GROUPS OF PARASITIC FUNGI.

lower Elbe, in Germany about the year 1880, and it soon spread widely. About the middle of June yellow spots make their appearance on the leaves, and at the same time the young Cherries begin to fail. They are stunted in growth, and the flesh of the fruit forms irregularly, or rottenness sets in so that the Cherries are quite unsaleable.

Professor Frank found an abundant mycelium in the tissue of the leaf underneath the yellow spots, and also in the damaged Cherries. During the summer small perithecia, filled with long curved spores, were developed on the yellow spots. The diseased leaves remain on the tree all winter, and are intermixed with the new foliage of the following season. In spring he found on the dead leaves a fungus fruit that had not been present on them in autumn, a perithecium round at the base, about one-twelfth of an inch in diameter, tapering up into a pointed beak that projects from the under-surface of the leaf. These perithecia contain the spores that re-infect the young leaves and fruit. The fungus had already been described by Auerswald, under the name of *Gnomonia erythrostoma*.

Frank traces the rapid spread of the disease in the Altenland to the overcrowding of fruit trees and to the presence of open ditches in the neighbourhood of the orchards, causing too much moisture, and so presenting conditions favouring the growth of parasitic fungi. While such adverse conditions should be remedied, he recommends, as the only method of stamping out the disease, the gathering and burning of all diseased leaves, which, he considers, need not be attended with more difficulty than the yearly harvesting of the fruit.

There has been no opportunity of our following the disease in Kent in its various phases throughout the year, and this notice is necessarily imperfect, but it is very important that Cherry growers should at once be made acquainted with the cause of the injury to the orchards and the remedy recommended by Frank. It is the more essential that steps should be taken for the destruction of the dead leaves, because of the abundant presence of the living fungus that has been observed in them. It would be a certain source of danger to the new crop if these active fungi were to be permitted to grow on the dead leaves while they remain attached to the trees. To be efficient, this collecting and burning of the dead leaves must not be done in a solitary orchard here and there, but must be carried out throughout Kent. No doubt this must entail much trouble and considerable expense. But the neglect of undertaking this operation, though costly, means the disappearance of the Cherry orchards of Kent in a very few years. The removal and burning of the dead leaves has been successful on the Continent, and there is no reason why it should not be equally successful in Kent.



## COMMON MISTAKES IN FRUIT CULTURE.

By Mr. GEORGE BUNYARD, V.M.H.

[Read November 20, 1900.]

BIOGRAPHY teaches us that ultimate success is often the offspring of repeated failures, carefully looked into, and strenuously wrestled with; and it is allowed that we often learn more from our downright failures than when all goes smoothly, and I therefore trust these few negative remarks may be of service to some of the Fellows of this Society.

One of the most widespread errors in Fruit culture is that of planting too deeply in the first instance, and thus the useful and fruit-supporting roots are situated beyond the influence of sun and air, and naturally perish, the result being manifested in the trees making strong unripened growth, leading to canker and unfertile spurs, with inferior fruit, specked and cracked by fungoid growths.

As a general rule, all Apples on the Paradise stock, and Pears on the Quince stock, should be planted in such a manner that the junction of scion and stock shall be one inch beneath the level of the soil. One of our best gardeners tells me that some trees he had did not progress, and he found they were planted wrongly, but on earthing them up with rich old potting soil they at once recovered. The new soil in this case probably induced the formation of new surface roots, which would account for the recovery of the trees.

Trees upon Free stocks (Crab, Pear, and Plum) should be planted with their roots as close to the surface as possible, so that the upper fibres are just covered by the soil, and in no case deeper than they have been growing in the nursery. The earth mark will be a safe guide for planting. It will sometimes happen in newly formed gardens that fresh soil, manure, &c., are added to the borders after the trees are planted. This is fatal to success; and where this is noticed the trees should be lifted, root-pruned, and replanted. We frequently see wall trees buried almost up to the branches. Newly planted wall trees should not be nailed to the walls until April, as, if the ground where they are planted sinks, they become "hung up," and the newly formed root fibres are destroyed.

Where vine borders are often heavily top-dressed, the roots become buried too deeply to get the benefit of needful sun, warmth, and air. In this case the surface should be removed until healthy roots are discovered, when they should be carefully fed with a thin layer of fresh loamy soil. For, as is well known, "shank" and mildew are produced by want of root power, as well as by half-ripened wood.

In orchards, trees are far too often planted by inexperienced hands, and a large hole may be dug, which acts as a water trap in winter; and in heavy land the soil cracks in summer, and the trees have a hard struggle to live. They should be planted, at first, rather above the general level, as they are sure to sink a little; and the surface soil should be kept open by hoeing, which will keep it from cracking, nor will

undue evaporations take place. In my experience I can relate three very bad examples of this common cause of failure. The first was a land-owner, who to save a few shillings elected to plant the trees with his farm men. Two years afterwards I was called in to advise, and found they had been planted 12 to 18 inches too deeply. The whole eight acres had to be lifted again; and, to show the loss of time that had taken place, I may say that whilst many had died, the residue had grown but 1 foot through the heads, when in another orchard planted at the same time by my own people the trees were 4 feet, and some of them more, through the heads.

The next was a case where the workman, to make a pretty-looking job, had planted some of the trees 3 feet too deep in order to bring all their heads level! They were an auction-sale lot of Cherries worked at all manner of heights.

The third case was a most flagrant one. A market grower purchased of me some hundred Peach trees, and in the May following he wrote to me, saying that nearly all of them had died. Now these trees, being on freely rooting Plum stocks, very rarely fail; so I at once went to see them, and on walking through the houses I noticed here and there one had done well, and my friend said: "You know, there must have been something wrong with them, or else why should a few live and all the rest die?" I replied: "The reason is this: the living trees have been properly planted. The others have been put in so deeply that the buds—which are generally twelve to fifteen inches above the ground level—are below the surface." After examining them and digging down, in some cases eighteen inches before coming to the roots, he said: "You have convinced me. I see my own men have done all the mischief. I must start again with a fresh lot." The only trees that were living were those which had been correctly planted.

In many gardens, vegetable crops, which are highly manured, are planted close to the walls, and the borders must be therefore frequently dug. Now all fruit trees delight in a firm root-hold, and when it is otherwise they are tempted to keep on growing late into November by the strongly manured soil which they find, and consequently rank growth abounds, and Nature's work of ripening the wood is retarded till too late, when early frosts are fatal to the sappy wood. For a remedy, leave a hard 3-ft. path next the walls; do not dig this, but just hoe the surface to prevent undue evaporation, and mulch and water freely when a crop is set.

*Watering Wall Trees.*—The fact that brick walls absorb from the soil a large proportion of the rain that falls in the winter is often overlooked. The moisture draws up the walls, and is dispersed by sunshine and wind; and over and over again I have been called in to see miserable trees, smothered with Red Spider, and only just alive, from the want of copious watering in the early growing season. The planter overlooks the fact that frequently, even after heavy rains, the soil next a wall is dry as dust, as it is rarely that rain comes down quite vertically—and storms seldom do so—so that the fruit trees upon some walls get no benefit; and especially is this the case where wide copings are used.

Inside-planted Vines often suffer from drought at the roots; and

Peaches and Nectarines frequently give up from want of moisture. In these cases a soil-tester, or the removal of the surface soil, will indicate the cause of failure.

Another source of trouble is from an exactly opposite cause. In wall trees it will sometimes occur that a border is lower on one side of the wall than on the other, and the consequent soakage keeps the roots of the trees in the lower position always in a damp condition, and renders lifting necessary. An ill-drained inside Vine or Peach border is also to be avoided.

I have seen failures—bud-dropping and yellow foliage—from the practice of growing Chrysanthemums in Peach houses. The frequent watering and the strong stimulants given to the flowers are very hurtful to the fibrous and tender surface roots of the fruit trees, which should be safeguarded. The same system of placing pot plants on Vine borders is also to be avoided where possible.

In olden times it was the custom to take all fruit trees away from the walls, after pruning them in winter, gathering them carefully on to large poles, placed in convenient positions, dressing the walls thoroughly with some insecticide, and then painting the trees entirely over with a like solution—generally a mixture of sulphur, lime, soot, soft soap, or any strong insecticide. They were then replaced with care, and naturally, where such attention was given, there was an absence of aphides and other like troubles. I remember once seeing an Elruge Nectarine (outside) so treated that carried 70 dozen fine fruits. I fear now the general routine of the garden, tennis lawn, &c., forbids this work being carried out regularly.

A long chapter could be written on pruning mistakes alone, but for our purpose it will suffice if we lay down a general rule, that Espalier Apples, Pears, and Plums on walls, cordons, &c., should not be pruned back before the first week in August. An earlier cutting only induces a second growth and keeps the sap in action when it should be resting, and trees "stopped" early in August have ample time to plump their buds before winter. Doubtless earlier pruning is carried out in many cases for the sake of neatness. Over-pruned trees can be made fertile by thinning the boughs and allowing them to extend for two years.

In the case of Peaches and Nectarines another rule is necessary. As soon as the shoots have made six or eight leaves the trees should be gone over, and thumb and finger stopping be given to the foreright shoots, and at the same time the "wild wood" (the extra strong shoots which often form in the central part of the trees) should be cut out entirely, or the balance of the trees will be destroyed. This hand work is far better than that of the knife. Any further pruning necessary should be done in February or March.

*Root Pruning.*—As a rule this is done too late in the season. It should be carried out as soon as ever the fruit is gathered, and *before* the leaves fall, as some new rootlets are then formed before Christmas, and a crop may be secured the first year. When done too late the trees may die, or at best go to sleep and form scarcely any leaves or roots for one or two seasons. The greater the care given to this process, the better the results are, and should a dry time follow the operation a good overhead syringing is necessary, as well as a liberal mulching.

It often happens that Plums on walls grow very vigorously the first few years and do not fruit. A timely lifting, root pruning, and replacing in loamy soil, without manure, will check this and throw them into a fruiting condition.

I strongly advise cordon trees on walls to be at first planted upright, and when they reach the top of the wall the time has arrived when they require root pruning, and they can then be placed at an angle. In this way spurs are formed on both sides of the stem, while when at first planted obliquely the spurs are naturally strongest on the upper side of the stem.

*Over-pruning and Stopping.*—We often see Vines and other fruits severely checked by these processes. It is advisable to proceed by degrees, and I believe more (grapes are spoiled by over-thinning of the foliage than any one is aware of, as the check caused by removal of the leaves often comes at a critical time and the colour is lost. The finest Grapes I ever saw were in a vinery where the thickness of the foliage made it almost twilight, even on a bright summer day.

*Thinning Fruit.*—This operation is generally neglected in the early stages, and the after crop is therefore small and inferior in flavour. It is better to harvest a moderate crop of fine well-flavoured fruit than to have a big gathering of what can only be called second-rate. In Peaches and Nectarines the larger the fruit the better, as a rule, the quality, and in a certain but lesser degree this applies to Pears also. And it was never more evident than it has been in the past season (1900) when thousands of bushels of fruit have been spoiled for the want of thinning.

Mistakes are often made in gathering late Pears and Apples before they are thoroughly matured, and consequently the fruit shrivels and is comparatively tasteless. Growers should not mind losing a few fruits from falling; it is better to have six good, firm, crisp Apples or Pears than a dozen flabby and wrinkled; and a frost of even ten degrees will not harm either Apples or Pears upon the trees. To illustrate this, we often find orchard-house fruit keeping firm to the last, because so thoroughly matured.

On the other hand, early Pears must be gathered before they are mature, or they become mealy; while all early dessert Apples should be eaten direct from the trees, as they spoil when stored, and it is a good plan to let them fall by themselves on to clean straw laid under the trees.

The culture of orchard-house trees in pots is frequently a failure because growers do not consider the confined space the roots occupy in their pots; nor do they give sufficient variety of food and nourishment; for instance, a Pyramid Pear outside would feed from some 8 ft. square of soil, whereas in a pot there is but a foot diameter to operate in. It is necessary also to syringe pot-trees very freely to counteract the evaporation from the foliage.

Many employers find fault with their garden produce and say, "But I see so much finer in the markets."

Naturally, because in the first place the best makes the most money, and the market growers are keen cultivators, and have learnt that to secure success, large, well-ventilated, and thoroughly heated houses, specially adapted to the needs of each subject, give the best results;

while in private gardens a dozen subjects, with perhaps opposite requirements, are crowded into one house, and where the surplus fruit from private gardens is sold it is useless to send the inferior examples to market.

It is often a cause of failure when over-strong or over-stimulating manures are called into use to make up for slovenly preparation either in thinning, mulching, or planting.

Patience is often severely tried by adverse seasons; for instance, an amateur once called me in to consult, and complained of the poor quality of the fruit in his garden. It was a very exceptionally cold and wet season. I assured him that he had the best of varieties, and that a more generous season would give him all he desired in the point of quality. He was, however, a type of those who ask much advice, and then act on their own wisdom; for he sent elsewhere and had all his trees cut back and regrafted, and I may be pardoned for saying that he not only lost two years, but the very same varieties were grafted on again, simply because there were none better. It is in all cases requisite to wait a cycle of years before one can form a correct judgment. Many hundreds of pounds have been sacrificed in this way by market growers rooting up bush fruits, and by regrafting on supposed inferior varieties, which a little better culture would have made profitable.

*Cultivation.*—How many of our orchards are literally starved to death! Animals are turned in them to eat the grass, but they are never fed with good nitrogenous food, and consequently all which should mature the tree roots is lost. Many a worn-out orchard has been quite recovered by feeding and fattening sheep in it, and a timely dressing of artificial manure has helped both young and old orchards, when combined with a due thinning out of the boughs.

*Purchase of Trees.*—I must say a few words as to this. Hundreds of large buyers have lamented that they first started with trees purchased at auctions, which may or may not be true to name; are often "dragged up" by inexperienced men, and planted by the same class of labourers. I cannot too strongly advise all buyers to place their orders with any thoroughly respectable firm who grow what they sell; to be ready to give a fair price for their trees; and when they do not themselves know the best varieties for their soil and locality, to place themselves in the hands of the dealers. There are numbers of first-class fruit nurseries up and down the country, and it matters little where they are bought, provided the trees are clean, healthy, and well ripened. Change of soil is an exploded myth, because, if the trees are sound and well rooted, they are bound to succeed. Many folk decide on the varieties they will purchase from specimen fruits which they see at exhibitions and on the market boards. In the former case much may have been grown under quite exceptional circumstances, and in the latter case sellers often label fruit with a popular but altogether erroneous name. Although this paper is mainly intended for amateurs, I cannot omit to remark that one of the most serious mistakes on the part of market growers in the past has been the planting of too many varieties, and thus a steady sale of any one variety which meets with approval cannot be kept up. For market purposes at least fifty trees of a variety should be planted, and three hundred is better.

*A Word as to Insects and Blights.*—The errors here are mostly those of omission, and the old adage, "Prevention is better than cure," is very apt in this connection. The best plan is to attack insects on their first appearance, and before they have got a hold or had time to increase and multiply. A timely attention to an aphid-infested twig will often check the evil at its first source, and prevent its spreading to other subjects. A curled leaf, or a twig where the leaves cluster together at the end, bespeaks the pest's presence, and the same spot should be inspected every alternate day, and the tree be carefully washed until the aphid has been entirely got rid of. American blight is another case in point; it wants attention at once, or the insects fly on the wind and establish themselves all over the place.

Another important point is always to have the rubbish heap outside the garden, and in a spot where it can be kept burning, with hedge-clippings, prunings, old stalks, &c., as nothing tends to harbour all kinds of insect life more than collected rubbish, which when burnt becomes a valuable manure. All stakes, pea sticks, &c., should be stored well away from fruit trees, and a supply of insecticides be laid in before the season arrives, so that the infested trees can be tackled at once.

A matter often delayed until too late is that of properly labelling fruit trees before the nursery labels are obliterated; it is needful also to see that the wire used for attaching the labels is placed on a stake, or on the wall, and not on the tree itself, as the branches grow so rapidly that the wire cuts in, and the mischief is not detected until a branch is literally strangled, the form of the tree spoiled, and not infrequently the commencement of canker set up.

In fruit culture, either under glass or outside, absolute cleanliness and abundance of light and air are requisites that should never be lost sight of. Trees that are "houey," or full of spray branches, or houses that are dull, stuffy, or close, cannot produce good fruit.

For the past five years we have been favoured with very grand summer weather for hardy fruits, and several old discarded varieties have thus been recommended in the press; but I feel that a word of caution is much needed here, as, should a wet and cold cycle appear, such varieties will cause great disappointment, whereas if growers would but select those varieties that succeed in unfavourable years, they might be confident that such would be still more super-excellent in a really good year. This point has been very pronounced during the year 1900, several quite third-rate Pears having been grand, and many Apples that fail to ripen in the Midlands and Northern counties have come up to exhibition quality; but let growers beware how they put their eggs in such baskets. Still we all should be very grateful for these warm sunny years, as they not only help the crops on the trees, but they lay a good foundation for future success by giving us firm, hard, and fully ripened wood, which an ordinary frost will not injure.

## THE HEATING AND VENTILATING OF HOTHOUSES.

By Mr. A. DONALD MACKENZIE.

[Read December 4, 1900.]

WITH the enormous increase in the prosperity and wealth of the country during the last fifty years, hothouses for the cultivation of fruits and flowers have increased in a full proportion. The maintaining of an equable temperature in such houses when the outside temperature varies sometimes as much as 20 to 30 degs. in twenty-four hours is not without difficulty.

The means used to accomplish this is in nearly every case now hot water circulating in pipes; the days of the old brick flues have gone.

The theory of the circulation of hot water in pipes is very interesting, for we are presented with an apparent anomaly by the rapid rise of the

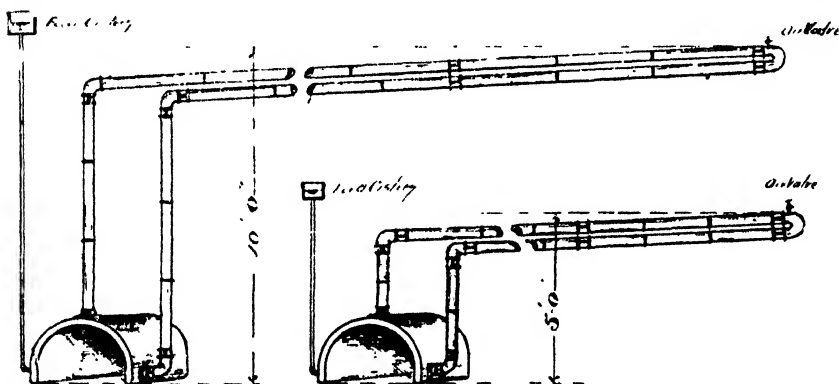


FIG. 164. —BOILERS, SHOWING FLOW AND RETURN.

water in the flow-pipe, apparently against the universal law that water flows to the lowest point—finds its level. But this is not the occasion for discussing this aspect of the question to any great extent. In passing, however, I may be allowed very briefly to draw attention to the cause of the circulation in a hot-water apparatus.

Fig. 164 represents an ordinary apparatus with a saddle boiler to which is attached in the ordinary way a flow- and return-pipe; the flow in all cases and in all classes of boilers must be from the highest available point of the boiler, and the return should rejoin the boiler as near the bottom as practicable. There is thus an endless pipe, the boiler being practically a part of the pipe enlarged and shaped for the application of heat. When such an apparatus is filled with water through the cistern and feed-pipe it is ready for use. When heat is applied to the part of the endless tube called the boiler what happens is this, the water expands—expands equally in all directions, downwards as well as upwards; but inasmuch as there is less resistance in the upward direction the whole expansion is diverted that way, the longer or rather higher column of water in the return-pipe resists the push of the expansion,

and the hot water is forced upwards, thus the circulation is begun and in the same manner continued. It is clear that the cause of the upward flow of the hot water in the flow-pipe is the greater density and weight of the higher and colder column of water in the return-pipe.

It can be proved that with an apparatus having a height of 5 ft. from the lowest to the highest point, and with an average difference of 10 degs. between the flow- and return-pipe, the water in the return is continually falling with a theoretical velocity of 68·4 ft. per minute. With an average height of 10 ft. the fall per minute is 96·6 ft., and in an apparatus having a height of 20 ft. the theoretical fall is 136·2 ft. per minute; in short, the motive power in a hot-water apparatus is entirely in the return-pipe, the amount depending on the height and on the difference of temperature between the flow and return.

In quoting these figures no account is taken of the friction, which may be very small, or may be sufficient to wholly stop the circulation.

In the heating of hothouses it is of the utmost importance to remember that the motive power is in proportion to the difference in height between the lowest and the highest points of the apparatus, which practically means the depth of the stokehole and rise of the pipes. Attempts are sometimes made to avoid sinking a stokehole, but such attempts are bound to be failures, and are only attempted by people without any knowledge of the underlying principles which govern the circulation of hot water in pipes.

It is well known to all experienced heating engineers that a boiler quite powerful enough to heat 1,000 ft. of pipe where there is a height of 25 ft. or 30 ft. will not efficiently work more than 750 ft. when the height is only 5 ft. or 6 ft.

Along with this must be considered the frictional resistance, which is the work to be accomplished.

For hothouse work there is a general agreement that a 4 in. pipe is the most suitable in regard to the quantity of water and the friction on the walls of the pipe; 3 in. and 2 in. pipes may, and often are, used, but probably 80 per cent. of the hothouses erected are heated with 4 in. In very large apparatus larger pipes are often used for mains, but the radiating pipes are almost invariably 4 in.

The relation between the size of the structure to be heated and the amount of heating surface is of the greatest importance; and although there are no scientific rules for this, practice has been much on the following lines, which, I think, except in the most exposed situations, are safe lines. Of course provision must be made against the coldest weather, which may be taken at 32 degs. of frost.

For conservatories where a temperature of not more than 45 or 50 degs. is wanted there should be 1 ft. of 4 in. pipe, or its equivalent, for every 35 cubic ft. of space.

For plant-houses, where a higher temperature may be required, the proportion should be 1 ft. of pipe to every 25 or 30 cubic ft. of space.

For stoves and orchid-houses, and also for early vineries, the proportion of heating surface should be still higher. An orchid-house 12 ft. wide requires four rows of 4 in. pipes along each side, which gives 1 ft. of heating surface to every 12 or 13 cubic ft. to be heated.

The lean-to and semi-span type of early vinery 16 ft. wide should have eight rows of pipes, being about 1 ft. of pipe to every 15 cubic ft. to be heated.

An intermediate vinery, if span-roofed, and 24 ft. wide should have twelve rows of 4 in. pipes, giving 1 ft. to about 16 or 17 cubic ft. A span-house naturally requires a larger proportion of heating surface than a lean-to.

Peach-houses 14 ft. wide with four rows of pipes have a proportion of about 1 ft. of heating surface to every 28 cubic ft., which may be taken as a fair medium where early forcing is not attempted.

Melon and general forcing-houses often have a forcing bed on each side, with four rows of pipe below each bed. When this arrangement is adopted it is desirable to have more than the usual proportion, as those pipes in the chamber below the bed cannot be counted upon but to about one-half their heating value. It is usual to put a row of pipe along the side above the bed, close to the front; but, in addition to this, it is desirable to have some pipes in the footway covered with an iron grating.

These various circulations should be controlled by valves, as there

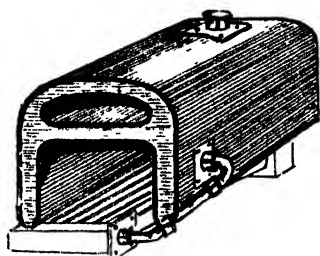


FIG. 165. — TERMINAL SADDLE BOILER.

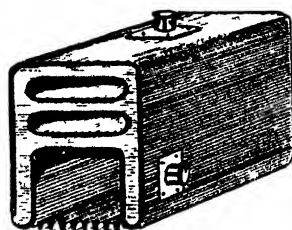


FIG. 166. — TERMINAL SADDLE BOILER, ANOTHER PATTERN.

will be times when no surface heat may be required whilst a good strong heat is needed below the forcing beds.

There should be ventilators in the wall of the forcing bed for the admission of air, and other ventilators above, close to the glass, for the escape of the heated air. In this way the temperature can be regulated as required.

It is not necessary to go into the question of boilers. There has been more controversy about the merits of boilers than any other detail in connection with hothouses. There are numerous patent boilers in the market, each one put forward by the maker or patentee as being the best. I have had very considerable experience of these during the last forty years, and my opinion is that a good deal of what is said in their favour may be discarded.

The old saddle boiler still keeps its hold as one of the simplest and, under reasonable conditions, one of the most economical; but I could not advise its use (except under special conditions) for quantities over 750 ft. of 4-inch pipe. For quantities from 500 to 2,000 ft. the terminal saddle boiler is powerful and economical. (Figs. 165, 166.) It takes more depth of stoke-hole than the plain saddle.

For larger quantities than 2,000 ft. I very strongly recommend a steel Cornish or annular riveted boiler, and where there is a reasonably good draught water bars are a great saving of fuel. (Fig. 167.)

Water bars may also with advantage be used with saddle and terminal boilers. With these water bars a large amount of heat is got when the fire is banked up, which would otherwise be lost or go to burn up ordinary metal bars; for it must always be kept in mind that what is wanted is a furnace and boiler that will go on for eight or ten hours without attention.

A very powerful sectional cast-iron boiler has been introduced into this country from America. I cannot say I am partial to cast iron for boilers, as, owing to the nature of the metal, it is much more liable to accident than malleable iron and steel.

The heating of a single hothouse, or even two or three when close together, is a comparatively easy matter, but when there are a great many circulations of various lengths and of various heights, there is very great difficulty sometimes in getting the water to circulate in the longer

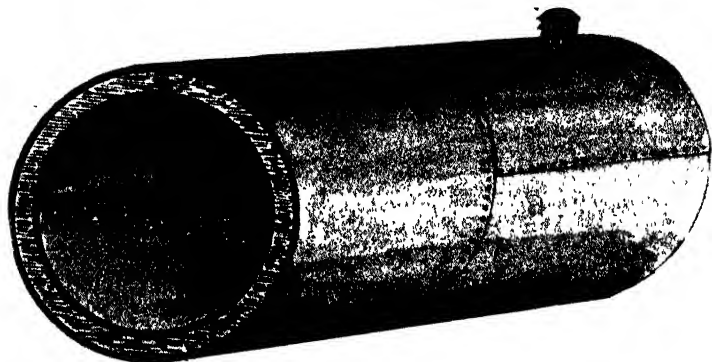


FIG. 167.—CIRCULAR RIVETED STEEL BOILER.

circulations. As an example of this I may refer to the very large apparatus in use at the gardens at Sandringham, the Norfolk home of H.R.H. the Prince of Wales. In this case some of the houses heated are over 400 feet away from the boilers, while there are others close at hand. Large mains are carried underground in a built tunnel large enough for a man to creep through and examine the pipes when required—all underground pipes should be in tunnels. The difficulty in getting the circulations at the extreme ends of the system to heat is caused by the short-circuiting of the nearer circulations—the hot water takes the line of least resistance. It runs round one house before it can reach another more distant, and when the hot water from the nearer house arrives at a point about midway in the main return it begins to back up in the wrong direction instead of going on to the boiler, and causes more or less of an obstruction—"a block." This may, in some cases, be so effective as to stop all circulation in the furthest off parts of the apparatus. And there is only one way of preventing it, and that is by regulating the valves in houses near the boiler. The valves should be very carefully watched until it is found how much or how little they must be open to prevent

the return water arriving at the mid-way point sooner than the return from the further off house. If the furthest off houses, on the other hand, were on a very much higher level, the tendency would be for the hot water to rush past the middle houses and the other circulations, and possibly the furthest off houses would have to be checked. In short, nothing but a careful study of the conditions and regulation of the valves will be effective in such a case in getting the required heating where wanted. In houses where a high temperature is kept up, especially where the sides are pretty high, a 2 or 3 in. pipe round the eaves is very useful to prevent down draughts. This has been adopted with very beneficial results by Professor Bayley Balfour in the Royal Botanic Gardens, Edinburgh.

I have left myself no time to say much about the ventilation of hot-houses, but this is less to be regretted because ventilation is a very simple matter. In all cases there must be bottom ventilation and top ventilation. The bottom openings should be as near the floor level as may be practicable, and with orchid-houses and where other delicate plants are grown the cold air should be made to impinge on the hot-water pipes so that the chill may be taken off. The particular manner of doing this must be left for each case to be treated on its merits, the most important matter being that the opening arrangement should be such that 1 in. or 1 ft. of an opening may be had at pleasure. The top ventilation should be at the highest point, and also must be arranged so that a very little space may be open in cold weather and as much as possible in very warm weather.



## HORTICULTURAL PROGRESS DURING THE 19TH CENTURY.

By Mr. JOHN CLAYTON.

It is impossible at the close of this century to look back and review from quite the beginning the growth of our profession—the honourable calling of gardening. We have not the time. The work would be enormous. We must content ourselves with glancing back a hundred years, and noting the changes wrought in our profession during that time. I sometimes think we do not always sufficiently value our privileges and the ancient establishment of our craft. Gardening is undoubtedly the oldest existing profession. We are told that in the very earliest days “God planted a garden,” and placed our first forefather there as gardener. Truly it was only a single-handed place to begin with, but what a start was then made! It was the commencement of the most delightful and engrossing of the occupations ever given to man. Medicine and law, while being of ancient origin, cannot claim quite the same antiquity as gardening.

I shall not, however, attempt to do more than refer very briefly to some of the more important changes which have taken place in connection with horticulture during the century just come to a close, which has probably been the most progressive century from every point of view since the foundation of the world. And I think that in the enormous increase in recent years of the devotees of the Goddess “Flora” we have an overwhelming evidence of the intellectual advancement of our times.

For the sake of clearness I have arranged my notes under six headings, viz. :—

1. The century's advance in the Vegetable Garden.
2. In the Fruit Garden.
3. In the Flower Garden.
4. In Glass Houses.
5. In Garden Literature.
6. In Gardening Societies.

## VEGETABLES.

Take first of all that staple article of food, the Potato. It is well known to all that the Potato was introduced into our island by that doughty knight Sir W. Raleigh, or by his companion Thomas Herriott, in the reign of good Queen Bess, and from its introduction, in 1585, to the commencement of this century not more than thirty distinct varieties are recorded, whilst to-day, so far as one can trace, there are certainly 300. Of course all are not improvements on their immediate parents, but even the poorest of them is a vast improvement on the tuber of 1585, or indeed of 1785; and taking the Potato as an example, it affords the most striking proof of the advancement of horticulture in the vegetable kingdom. I find that in 1836 a Scotch firm quoted 186 varieties, whilst a few years

ago Messrs. Daniels, of Norwich, staged 500 dishes at a London show, mostly distinct. Speaking of Potatos, I feel that I must here mention the name of Mr. Robt. Fenn, who has during a long life devoted much skill and energy to the raising of new varieties.

In the families of Peas and Beans as great an advance is evident, and whereas our forefathers were astonished at the size and productiveness of 'Daniel O'Rourke,' and when to get a pod with five or six Peas in it was the exception, now we know it is a common announcement in our seedsmen's lists to read of "pods fully 6 in. long, containing eight to ten fine Peas of splendid flavour." The introduction of the dwarf early varieties of garden Peas is an inestimable boon, especially to amateurs and those whose space is limited. With Beans, again, the same remarks in great measure hold good, although many of the varieties grown in the early years of the century are still in commerce. Yet an advance is evident, as we now get Beans of the Broad section with pods 12-15 in. long and well filled. The introduction of the Climbing French Bean is also an immense advantage, and this class is very rapidly becoming popular. In reference to Peas and Beans what should now be aimed at is, I think, not so much length of pod as quality of the contents, for I am sure you will agree with me that many recent introductions need more body.

Then in the Brassicas we have gone vastly ahead of our forefathers. In the early years of this century, a Cauliflower with a head thirty-six or thirty-eight inches in circumference, of perfect quality, was unheard of; but it is by no means unusual to meet with them to-day. Indeed the Cauliflowers and Cabbages are assuming such giant proportions that our cooks are often at a loss to boil the giant heads whole. But this I do not look upon as altogether an advantage; and it is, I think, now acknowledged by all the largest market growers as well as by private gardeners that what is wanted is a medium-sized sample, but of first-rate quality. And this applies to other things than Cauliflowers.

Though strictly speaking a fruit, it seems more fitting to include the Tomato among the vegetables, and it is of course patent to all what a tremendous leap into popularity the Tomato has taken, and that even in our own time. Anyone who has numbered fifty years could tell us of the time when it would have been useless to show a dozen baskets in the market, as the public had not then acquired the taste for them, and I myself remember when they were first produced in quantity. But what a change has come over the scene! I am informed by a large producer that no less than ten tons of Tomatos are sold every week in the season in Norwich alone, and the quantity disposed of in the large industrial centres of the kingdom must total up to hundreds of tons a week during the season. I find that in 1852 one of the largest wholesale seedsmen in this country quoted only one variety, called the 'Red Love Apple, or Tomato,' and now almost every gardener and all nurserymen possess a variety of their own, which of course is always "the best in cultivation." And the growing of Tomatos has now assumed such proportions—in spite of the "Disease" of which we have heard so much during the past season—that the railway companies have in some instances been obliged to put in special sidings to provide further transport.

The Onion, of which at the commencement of the century there were about six varieties, is now represented by fully six dozen. In the opinion of medical men the Onion is a most nutritious vegetable, but as an article of diet it is very neglected. The Onion is now grown to great perfection and to a marvellous size. A gardener some years ago exhibited twelve bulbs of the 'Ailsa Craig' at the Crystal Palace, and they turned the scale at  $37\frac{1}{2}$  lb. This is exceptional I know, and there is little to be said in favour of growing such giants for general culinary purposes; a medium-sized bulb of good close tissue for lasting is greatly to be preferred. In an article I recently read in *Chambers's Journal* the writer set forth the virtues of the Onion at great length: he claimed for it that it was practically a "cure-all" in most cases of bodily ailment, and laid great stress upon the beneficial effect it had on the complexion. It gives a glow of colour, I am assured, that is most *permanent*, and will not run even when exposed to the most inclement weather. The name of Mr. Deverill is closely associated with the advance of the Onion, having given great attention to its selection and improvement.

Years of quiet methodical work—in many cases by most modest, unassuming workers in quiet country gardens, often unnoticed and unappreciated—have resulted in the present high state of perfection reached in all departments of the vegetable garden; and I should like, before leaving the subject, to impress upon journeymen and young gardeners the great importance, from a thorough gardener's point of view, of having during their training a good turn in the kitchen garden department. In later life it is necessary to know for oneself in order to properly direct others; and then is the time that a practical knowledge of outside work is appreciated and needed. Quite equal skill, if not superior, is needed to keep up a regular supply of outside vegetables to that needed for indoor fruits and flowers; and I cannot help thinking that this is one point in which we have not progressed in recent years. I know our vegetables are much finer, but I hold that, generally speaking, gardeners as a whole come short of their forefathers in this particular, and it can be traced, I believe, in some measure to the lack of outside training when young. In Scotland the old method holds good, but not, I venture to think, sufficiently so with us Southerners.

#### FRUIT.

Undoubtedly the most signal instance of progress in the Pomological department of our craft has been, and is, the boon conferred upon us by the introduction both of very early and very late varieties of fruit, thereby making it possible to have, for instance, a constant supply of good Peaches from June to October, and that without calling in the aid of artificial heat. This point is certainly remarkable and should be appreciated.

Other noticeable features are the splendid improvement evident in the quality and size of all new varieties of fruits, both hardy and hot-house. In Apples we perhaps notice this most, as they are such a staple fruit and so much used; but it is equally true of all others. And there is no doubt that the great strides taken in this direction have been

greatly assisted by the many exhibitions of hardy fruits fostered and encouraged by the Royal Horticultural Society, and undertaken with the hearty co-operation of the large nurserymen and private growers. By these means the appetite of the general public has been whetted to procure the very best varieties, and barren trees and worthless varieties have been stubbed up and burnt and their places filled with improved varieties, of which we now have so many that a gardener is able to have a supply of splendid Apples almost all the year round.

Much, very much, has been done in this direction, but we are still far from being perfect. The orchards in many country districts are sadly neglected, and the farmers and cottagers by this neglect have lost and are losing thousands of pounds yearly, which would otherwise have assisted in making up the wretchedly low price of corn or the short-comings on other crops. In the more famous fruit-growing districts of Kent, Hereford, and Worcester great care is taken, but in this county of Norfolk, and in many others also, it is not so.

Apples and Pears, even when planted in the hedgerows between fields in country districts, while being a most beautiful addition to the landscape when in blossom, give as well a fair return in fruit if attended to. And I find that our imports of foreign Apples for September of the year 1900 cost us £70,613! During the same month in 1899 we spent £78,609; but notwithstanding this drop of £8,000 on the month, I find the total bill for 1900 up to the end of September reaches the enormous total of £545,501, and this for *Apples* alone! And if you ask me why this is so, I think it is that our American cousins and our colonial brethren have studied the whole question deeply, and have decided to send us only the very best graded fruit, and that well packed, while we at home are so engrossed in other matters that we do not bother ourselves with such things, but send all together to the market just as they come from the trees, and, as is to be expected, the bad baskets (although probably only a small proportion of the whole) spoil the good ones, and the buyer gets the lot at one price, and that, of course, the *price of the poorest*.

Did space permit I should have enjoyed dealing with all the various fruits, as the Strawberry, of which we have now fifty or sixty varieties, and those mostly good ones, against two or three at the commencement of the century, and those little better than the wild one of the hedgerows.

The Raspberry has produced fewer novelties, but is well represented by that variety whose name tells its own tale as being an advance—'Superlative.'

Of hothouse fruits the improvement in Peaches and Vines has been something wonderful. Mr. McIndoe writes:—

"Of all branches of horticulture probably nothing has advanced more than the cultivation of the Grape Vine. Fifty years ago only the very wealthy people in this country ever tasted home-grown grapes, now they are a common article of food, and can be procured at a wonderfully cheap rate."

#### FLOWERS.

Here again there has been the most positive progress all along the line, and I consider that one of the most beneficial features of that

progress has been the increased and still increasing interest taken in home gardens. I mean especially in the *small* gardens, the tiny patches of soil one sees round the cottage doors in our crowded districts, as well as in the more elaborate and extensive villa gardens of our merchant princes and business men.

Home gardening is a most estimable hobby for the British working man to cultivate. What a first-rate innovation allotment gardens have been in the suburbs of our large cities and towns to the workers! They give recreation to the tired artisan, as well as a return in home-grown vegetables and fruit, which if no cheaper as regards actual cost are far more valued and valuable, in that the owner can tell his comrades that *I* grew these; and that little pronoun *I* represents an honest and honourable pride, and not improbably tells of many a shilling saved from the ale-house. Our city of Norwich does not perhaps feel the need of allotments so keenly as most other cities, being deservedly called "The City of Gardens," a most envious position to occupy; but in the manufacturing and colliery districts of the North and the Midlands, where the light of the sun is practically excluded all day, these are the places where the real need and consequent appreciation of allotments and their attendant pleasures are noticeable, compelling as they do the careful attention of their possessors, and giving healthy and restful occupation, after laborious bodily toil, both to mind and to body.

Another point of progress I must note, and that is the return of the wandering lovers in horticulture to their first love, in the old-fashioned naturally-grown English perennials, now again so deservedly popular, after nearly a century's neglect; a revival which has been greatly assisted by the bringing to bear of the skill of the hybridist, as well as by the introduction of a host of new plants. The herbaceous class of hardy flowers appeals to all—so easily grown, so permanent, and so beautiful, giving us from earliest spring till the late autumn a continual succession of charming flowers, and almost all of them useful for cutting for house decoration. Garden lovers owe a deeper debt of gratitude than probably they are at all aware of to Mr. Wm. Robinson, who by his writings in the *Garden* (of which he was the founder, and for many years the editor), and by his untiring efforts in every direction, has been mainly successful in bringing back English gardeners to the love of an English garden, and in weaning them from the French "carpet" system, which threatened at one time to exterminate all hardy plants.

How marked has been the progress at the hand of the scientist and hybridist! What energy and care has been devoted to the Begonia, the Rose, the Sweet Pea, and numberless others! How many of those who enjoy the new flowers ever think of the hybridist's many disappointments and much labour lost before he meets with success? And how often his only reward is the satisfaction of knowing that by his labours he has produced something which has given infinite pleasure to thousands. And with this reward he is not only often obliged to be, but generally is, really content; for, for anyone to get his full measure of enjoyment from the gardening art, he must be filled with the desire to give pleasure to others and lend a helping hand to everybody he can.

In speaking of the advancement in the floral departments of our craft

mention should also be made of the marked improvements of recent years in the various species of flowering bulbs, as *Liliums*, *Gladioli*, *Narcissi*, &c., the greatest skill again having been exercised with splendid results.

During the summer I read the report of the Annual Prize Distribution to the scholars of one of the Norwich Schools for their "Garden Plots." In this branch of education we have advanced somewhat, for we have in the closing years of the century made a start, but we are hardly across the threshold, as it were, with this most important work, and if our sons and our daughters are to grow up God-fearing men and women, we can not do them a greater service than to include in their education the study of the wonderful works of Nature as evinced in plant life and growth. This study will give them patience and encourage them to persevere in whatever they take in hand, for the art of gardening calls for an extraordinary amount of faith—we cannot see the results until some time after our work is done. I would urge the attaching of a horticultural class to the curriculum of all our public schools, whether city or country; such study cannot fail to be most beneficial.

It is with the greatest pleasure I notice the work being now undertaken by means of experiments, demonstrations, and practical classes in agriculture and horticulture under the auspices of the various County Councils and local authorities all over the kingdom. The age has now passed when men can afford to ignore the scientific work and methods of advanced horticulture, and the thorough practical gardener of the future will no doubt be the man who combines theory of the highest order with practical experience: this work will be crowned with success.

#### GLASS HOUSES.

What a revolution the greenhouse has wrought in our land! When I read that one firm of renowned market growers possesses 180 acres of glass houses!—why, if our grandfathers could see those enormous areas covered with glass they would hardly credit their senses that such a revolution could have taken place in a century. Beyond doubt a great impetus in the erection of these miles of glass has been the adaptation of heating by means of hot-water pipes, a plan unknown to our grandfathers, which has worked a veritable revolution in many of our methods of gardening. We smile now when some dear old gardener tells us of the watchful care and terribly hard work expended on growing and forcing fruit or flowers when the only known means of heating the houses was by diverting the flue all round the house before it was allowed to enter the upright of the chimney. We wonder how it ever was done, and we hardly realise the transformation now when the merest amateur can have his tiny greenhouse heated by an up-to-date method of hot-water pipes, easily fixed, in a manner which fifty or sixty years ago the gardener of the king could not command.

Mention must also be made of the improvements in the style of buildings. We still see in some of the old-fashioned houses the tiny panes of glass which were used years ago when there was a tax on panes of glass over a certain size, and when it could be remarked that "God gave the light, but man put a tax upon it." Now, in place of these tiny squares we have large ones, and consequently light airy houses instead

of dull stuffy ones ; and though, perhaps, we do not season the wood nowadays so well as our grandfathers did before we use it for building, still it answers well enough for a time, and we progress so quickly that what is to-day up to date may in thirty years' time be quite obsolete, so we need not build glass houses for our posterity.

A marked feature, attributable to the improvements in glass houses, has been the great multiplication of the kinds of plants grown in them ; Orchids, for instance. At the commencement of this century the places where these royal plants were cultivated could be counted on the fingers of one hand, and now every year millions are imported and sold. Market growers have houses full of each variety, and many of quite the most beautiful are to be had at a price paid by our fathers for bedding plants. The stimulus given to the growth of all choice exotics, as Crotons, Dracanas, Palms, and all the many beautiful tropical plants, can be traced to the same cause. Nor has the advantage of these improvements been only to the benefit of the wealthy, for the universal extension of glass houses has had the supremely beneficial effect of bringing many real luxuries within the reach of the poorer classes ; for example, Grapes, which years ago were sold at 10s. to 15s. a lb., and can now be had at a tenth of that price, and that both early and late in the season.

We have in quite recent years called nature in to our aid in another very opposite form to hot water ; I mean the refrigerating process, whereby the growth of vegetation is arrested ; and the gardener has now only to pass the plant from the refrigerator to the forcing pit and " *Alì presto!* " it is in bloom ; be it Lily of the Valley in summer, or *Lilium* in February, it is all the same.

#### GARDEN LITERATURE.

I think I shall not be accused of belittling my forefathers when I say that at the commencement of this century very few practical working gardeners were noted as scholars, and no doubt, speaking generally, they were very backward in regard to book learning. Of course they had the " *Green Book of Nature* " continually open before them, and with this they were mostly content ; but now what a greater privilege is ours - with science to help us to unravel the difficult problems, and the army of most instructive works specially devoted to the furtherance of our craft. And apart from the scientific writings on Horticulture, a pleasing feature of progress is evident in the blending of Horticulture with Literature generally—an evidence this that amateurs are more keenly interested, and take a livelier share in the pleasures of this most delightful of all human pursuits. And the Horticultural Press, what a boon it has conferred on millions during the past half-century ! From very humble beginnings it has grown until now it is a power in the land, and in the pages of the weekly journals we are brought into touch with the minds of some of the most distinguished men in all lines of thought.

Speaking on this subject the Dean of Rochester said the other day :— " I welcome the sentimental element which has been introduced into the works on gardening, that element which appeals to the intellect and to the imagination. I have known so many young persons, anxious for information about the garden, who have been deterred by the dullness and

monotony of those books which are written to instruct them. I even venture to plead for occasional gleams of humour. Half a century ago it seemed to me that the garden promoted the greatest joy and usefulness of my life, and I tried to communicate to others the happiness which I had found myself. I wrote accordingly to the *Gardeners' Chronicle* and to the *Florist*, and although I was denounced as frivolous by a few stolid philosophers, I received such encouragement on the whole that I spread my wings and took a higher flight, and in a little book which I wrote about Roses I have, from that time to this, achieved the influence which I most desire to possess. I think that we have great reason to be thankful, and to congratulate each other that not only has the love of gardening increased, but there is a far more refined ambition as to the arrangement of the garden. Some people say that it is a retrograde movement, but I say when you go back to our old style, the English or the natural style, it may be retrograde, but it is the return of the vagabond to the right way. I do not depreciate for a moment the value of the introduction of half-hardy plants. I think there are places in which they are most appropriate. I do not fail to admire their combination with stonework around the palace, the castle, or other spacious mansion. These form a beautiful frame, but this arrangement is not a garden; a garden is a place of seclusion, of meditation, and restful peace. A garden is a place in which you collect the most beautiful things that you can procure, and in which you arrange them to be as like nature as ever you can make them. And it is gaining influence in the minds of the public that this horticulture, this beautiful blessing with which God has enriched your life and mine, should not be restricted to the rich or even to the middle classes, but it should be offered to the working man. I rejoice in the efforts which are being made by the great landed proprietors and by the County Councils to promote this object. I will only say of it from long experience, that if you can once get a man to see that he can grow things pleasant to the eye and good for food, and at the same time teach, as the County Councils in many instances are trying to teach, his wife how to cook them—you will have done more to keep that man from the public-house than by any other process. For the gardener,

He wanders away and away, with Nature, the dear old nurse,  
And she sings to him, night and day, the hymns of the universe;  
And if ever the way seems long, and his heart begins to fail,  
She sings him a yet more wonderful song or tells a more wonderful tale."

One of the great advantages of a love of gardening is the break it makes in the continuous strain of business thought. No real lover of a garden ever died of insomnia. This is a disease which follows those by night who cannot throw off the thoughts of daily life; they retire to think, instead of to sleep, and the darkness and quietness of the night favour the thought. To leave behind the business of the city for the pleasures of the trees and flowers of the suburbs has saved numerous lives that would have otherwise been broken down.

#### SOCIETIES.

As a natural consequence, following upon the remarkable expansion in the interest taken in gardening, comes the fact that the number of

workers have multiplied very greatly, and, as is so often the case in all walks of life, so is it, alas! too true in ours, that worthy workers in all departments of gardening have been, and still are, through no fault of their own, often compelled at the close of their lives to feel the pinch of poverty. I am therefore delighted to put on record briefly the fact that in connection with gardening the charitably disposed and more fortunate members of our fraternity, over sixty years ago, founded *The Gardeners' Royal Benevolent Institution*, and this excellent Society is at present supporting 179 persons, 98 men and 81 widows, of varying ages from ninety downwards. Since 1838 the Society has expended no less than £84,000, and it is the only institution of its kind in the kingdom. To carry out this excellent work the sum of £3,256 a year is needed, and of this only £900 a year is assured by investments.

In 1887 the gardeners of Great Britain were considering, with all other loyal subjects, how they might best commemorate the Jubilee of our beloved Queen, and it was at last decided that the most fitting way of celebrating this auspicious event in the life of our late excellent sovereign, who at all times extended most kindly patronage to our craft, would be the institution of a Fund to aid the orphans of gardeners who were called away in early life and whose children were left without a breadwinner. The outcome of this idea was the founding, under Royal patronage, of the "Gardeners' Orphan Fund," and this Society is to-day, after thirteen years' existence, able to report that 113 children have been elected to its benefits, and the sum which the committee have been able to distribute among destitute orphans during that period amounts to £7,711. 2s. 6d. The number of children now on the Fund is 72.

Reference should also be made to the excellent efforts of self-sacrifice made by lovers of our craft (and of course I include both amateurs and professionals) in the institution and successful continuation of Paxton Societies, Mutual Improvement Societies, &c., all over the length and breadth of the land—institutions doing somewhat to enkindle and keep burning the enthusiasm and love of gardening, and holding meetings at which gardeners give their practical experience and tell their younger brethren how to avoid the pitfalls which they themselves have personally encountered, warning them against the enticing ways of some new fangled methods, probably misleading, and so guiding the babe in Horticulture over the rough and stony paths of first endeavour, until he is safely walking on the solid path of success. These efforts deserve notice, for they are often attended by much self-denial, but it is given lovingly and willingly, and is the sure foundation of greater work to follow, which when we have done our best will be carried on by our children; for although the work of the past century seems to us to have been prodigious, and the march of progress to have been very rapid, still we have yet to see the Blue Chrysanthemum, the Scarlet Narcissus, the Yellow Shirley Poppy, and many other greater novelties than these. But that these will come we may be confident, and possibly at the end of the 20th century our successors will look back and sympathise with us in our narrow methods, and on our slow-going times; at least let them not be able to reproach us with any slackening of the efforts which the last century has bequeathed.

## NARCISSI IN NEW ZEALAND.

By Rev. J. G. W. ELLIS, F.R.H.S., Lawrence, Otago, N.Z.

IF any apology be needed for the appearance of this paper may I suggest, then, that even if the Fellows of this Society are not interested in New Zealand they are interested in Narcissi; and if an interest in New Zealand as a place for growing them can be awakened I shall be satisfied, though beyond that the knowledge of how luxuriantly many of the varieties (including some of the reputedly delicate ones) grow may be of value to many of the enthusiastic growers in the Society?

In the Hon. W. P. Reeves's book on New Zealand, called "Ao-Tea-Roa," which being interpreted means "The long white cloud," and is a Maori designation of these islands, English readers are "warned not to expect in the aspect of New Zealand either a replica of the British Isles or anything resembling Australia. The long, narrow, mountainous islands . . . are so far from being the antipodes of Britain that they lie on an average twelve degrees nearer the Equator. New Zealand has no warm Gulf Stream to wash her shores, neither is she chilled by east winds blowing upon her from the colder half of a continent. The western coast of New Zealand is one of the rainiest parts of the Empire, even the drier east coast only now and then suffers from drought."

A Narcissus grower, whose home like my own is in the Southern Province, Mr. A. Wilson, M.A., Rector of the Boys' High School, Dunedin, who is not only an enthusiastic grower and a recognised authority, but the pioneer of the province in Narcissus culture, says: "What the Daffodil seems to want is a climate where there is everything by turns and nothing long; an eager and nipping air, constantly in motion, for the most part violent and always brisk. Abundance of moisture well distributed throughout the year; a grey sky for the most part, with a sunny day at measurable intervals; a boisterous summer, a settled autumn, a tolerable winter, and a variable spring seem to be the weather conditions suited to the Narcissus." What Mr. Wilson says might be taken as descriptive of the Otago climate. It follows then that the Narcissus is suited as to climate here, and if one needed evidence of the fact it was furnished on September 26 of last year at the Dunedin Society's Spring Show, where there was a display that every enthusiast might well be proud of. The Narcissus needs "a cool bottom" in the matter of soil and situation, and this, too, New Zealand can furnish; there is no fear of the bulbs "stewing in the ground," as they are reported to do sometimes in Australia, and the effect of this "cool bottom" is, perhaps, to produce a size of bloom which, when described to the Australian, makes him think that New Zealanders exaggerate. This size of bloom is particularly noticeable in those varieties that in England have a tendency to coarseness.

New Zealand possesses several enthusiastic growers of this lovely flower, perhaps more than England does in proportion to its population; though the colony is much behind the Motherland in many things

connected with the culture of the *Narcissus*. Mr. Peter Barr, V.M.H., met several of the prominent growers when he visited New Zealand last year, and he is reported to have said in Melbourne (Vic.) that "the folks in New Zealand talked Daffodils morning, noon, and night." That may be true, for of course he met those who called him "the king of Daffodil growers," who were themselves growers, and who necessarily talked about them. Had he timed his visit for September, he might have seen that New Zealand could do more than *talk* Daffodils. Mr. T. Mason, of Tai Ta, a district a few miles distant from Wellington, has a collection comprising three hundred named varieties. Professor Thomas, of the Auckland University, has upwards of two hundred varieties, exclusive of *Tazettas*. Mr. J. G. Davies, a professional grower of Christchurch, who for two years in succession has won the R.H.S.'s bronze medal for eighteen varieties in the Dunedin Show, grows three hundred varieties. Mr. A. Millar, of Mornington (Dunedin), has nearly all the varieties catalogued by Messrs. Barr & Sons, of London, and Mr. H. Hart, of Lawrence, has about one hundred and fifty varieties. Scores of other growers have less. At the last Dunedin Show (already referred to) there was a competition for one of Barr's Silver Cups—a table of forty varieties. There were four competitors, and there were some ninety-eight varieties staged on the various tables; there were only four varieties common to the whole four tables, these were *Emperor*, *Sir Watkin*, *Barrii conspicuus*, and *Leedsii amabilis*; there were fifty-eight varieties that were not in more than one exhibit. This will, I think, give a fair idea of the great number of varieties that are grown.

Most of the varieties seem to retain their home reputation, and they do not appear to change their characteristics, though Professor Thomas has brought under my notice that *Horsfieldii* flowers *after* *Empress* with him.\* In my own garden it is quite a week earlier. I think that on the average throughout the colony Henry Irving is the first to flower, followed by Countess of Annesley and Ard Righ. Many and bitter are the complaints about *Maximus*. "I have great difficulty in flowering *Maximus* under any treatment," is a general wail; but I think that this is because there is a miserable form of Daffodil sold under this name by bulb dealers which is not *Maximus* at all. When one is fortunate enough to get the real thing he can get superb flowers. I had some sent me from Canterbury (N.Z.) last season, the flower stalks 15 inches long and the trumpets  $3\frac{1}{2}$  inches. Mr. Wilson has a *M. longivirens* from Hartland, of Ireland, that is in no way different from the ordinary *Maximus*, and Mr. Davies has a *M. obvallaris* that is simply a little earlier flowering and bears not the slightest resemblance to *Obvallaris*.

I believe that many of the weaker varieties in England are likely to do much better in New Zealand. *Obvallaris* grows like a weed, and under good conditions the bulbs are like fair-sized Potatoes. Mary Anderson grows in Dunedin to such perfection and so prolifically that one man had a large sized bouquet of them for exhibition, as one would have a bunch of Buttercups. In Auckland this bulb increases rapidly, but requires frequent change of soil.

Colleen Bawn is a gem of the first water, and does remarkably well,

\* Possibly the names have got accidentally shifted.—Ed.

though in this case, as in that of *Maximus*, there is a spurious variety, but where the true variety is found it is loudly praised. Two or three seasons ago I got one bulb at planting time; that one bulb bore nine flowers, and my friends predicted it would die, but at planting time it had eight offsets, every one of which bore a flower, and the parent bulb bore five, and again had four offsets.

*Countess of Annesley* is another that grows like a weed.

*Ard Righ* is inclined to rot away if the ground is too moist, and its increase under favourable conditions is only moderate. *Pallidus præcox* and *P. p. asturicus*, whilst not showing very great increase, hold their ground and bloom very well.

The newer ones, such as *Madame de Graaff*, *Commander*, *Dr. Hogg*, *Glory of Leyden*, *Beauty of Haarlem*, *Gloria Mundi*, *Victoria*, &c., require about a year and a half to become thoroughly acclimatised. One bulb of *Mdme. de Graaff*, imported by Mr. Hart, has in that time made five bulbs; *Glory of Leyden* has only made three. Professor Thomas's experiments have taught him that some varieties which Barr says should be planted in grass or half-shade are very vigorous in the full blaze of the sun in lat. 37° S.

With the bulk of growers who have tried them (not many have) *N. cyclamineus*, *minimus*, *triandrus calathinus*, *t. albus*, *corbularia citrinus*, *c. albus* are inclined to be failures, but they do remarkably well in the sandy soil on the banks of the Avon, near New Brighton (a watering place adjacent to Christchurch).

The time of the flowering naturally varies considerably in various parts of the colony. In Auckland there are a few flowers at the end of June; by the middle of July the majority of the earlier varieties are in full bloom. In the first week in September *Emperor* and *Empress* are abundant, *M. J. Berkeley* almost over, *Glory of Leyden* at its best, and a great proportion of the *Incomparabilis*, *Leedsii*, *Barrin*, and *Burbidgei* varieties in bloom. This period represents the time when the greatest number of varieties is in bloom, and is about four weeks later in Dunedin, and still a week later in this locality.

We have no one in New Zealand to rank with the Rev. Mr. Engleheart, V.M.H., as a hybridiser and raiser of new varieties, but there are several in the colony who are sufficiently interested to try to get something really first class. Last season one of the colonial growers visited Christchurch and saw several of Engleheart's new seedlings in the garden of Mr. Heaton Rhodes, M.H.R., and also some seedlings grown at Christchurch, and thinks that the New Zealand seedlings compare favourably with them. Mr. Mason has about 1,500 seedlings growing; about 100 of them have flowered, and no two seem to be exactly alike. The seed was gathered just where a pod could be found, and with no attempt at classification of parentage. Professor Thomas's seedlings that have bloomed are in a similar condition; but he has a great number of seedling bulbs, which have not yet flowered, which have been carefully crossed with definite purpose. Mr. Wilson has quite a number of seedlings carefully hybridised; about forty of these bloomed last September—the sixth year from sowing the seed. They were exhibited at the Dunedin Show and were awarded a Certificate of Merit. About half a

dozen of them were meritorious blooms and worth naming, but Mr. Wilson was content to have the best one in the estimation of the certifying Committee named at that time, and this was one with the characteristic of *Obvallaris*, larger in size and lighter in colour, the parentage of which is not yet definitely fixed, for by an inadvertence the blooms were mixed while they were being cut. This will be overcome next year, when the flower appears; the bulb, which is already marked and corresponds to a table kept by Mr. Wilson, will be carefully fixed upon. I think it may be found to be *Obvallaris*  $\times$  *Emperor*. The flower was named 'Captain Harvey,' in memory of an ex-High School boy, who went to South Africa as a soldier of the Queen and was shot through the head by a Boer bullet. Others of Mr. Wilson's raising are *Emperor*  $\times$  *Maximus*, *Princeps*  $\times$  *Albicans*, *Horsfieldii*  $\times$  *Poeticus angustifolius*, *Pallidus præcox asturicus*  $\times$  *Jonquil*. This latter one gave a sweet thing--rush-leaf foliage, and a twin flower, shaped somewhat like the *Nelsoni* type, primrose-yellow in colour. *Horsfieldii*  $\times$  *Poeticus* gave flowers similar to the *Leedsii* type, and convinced Mr. Wilson that the idea he had that there was *Montanus* "blood" in the *Leedsii* varieties was an erroneous one. Mr. Davies secured the first award for a New Zealand raised *Narcissus* in the Christchurch Show of 1899 with one that he has great expectations of, the parentage of which is obscure. It has been named *Dreyfus*. Mr. Davies, like most of the others who have tried raising from seed, did not keep a record of the crosses, or did not know them, in the earlier batches of seedlings raised, and, as in the case of Professor Thomas, is hoping for good results from careful selection and hybridisation in the years to come.

Some years ago Mr. Mason saved seeds of *N. triandrus pulchellus*, which came true to the parent and furnished him with good strong bulbs, but increase somewhat slowly. The single *Jonquil* and *N. corbularia* conspicua seed very freely, and come true, and flower the third year from sowing the seed. Most of the varieties bear seed if allowed to, Countess of Annesley and *Princeps* most prolifically, and I think the bulk of seedlings that have been raised in New Zealand by those who have not approached the matter in a scientific or semi-scientific manner are from either one or other of these. I think that in a few years' time, when the results of the careful labour of these gentlemen in crossing the varieties have flowered, several New Zealand raised *Narcissi* will not only be worth naming, but will be worth sending across the ocean to the Motherland; we have to wait for that time.



## THE CULTIVATION OF ORANGES.

By Señor ALÍSO, F.R.H.S.

MANURING is one of the most important operations in the cultivation of the Orange. Although with some other plants one may dispense with manure, or give it only a second place, with the Orange one daily notices an increase in the means used by the agriculturist to provide sufficiently abundant nourishment to compensate for the great demands made by the strained existence to which this valuable tree is subjected. There are few now who do not manure their Orange trees in one way or another, and their number will certainly decrease rapidly as growers come to understand more and more that the rational and systematic application of fertilisers increases the returns and gives to the plant vigour, health, and resisting power, without which it is impossible to pursue its cultivation profitably.

It is absolutely necessary, then, to manure well, and with a knowledge of the results aimed at, since this is the only resource that active and intelligent growers possess to make the Orange attain its maximum production. The grower must consequently not be niggardly in his expenditure for fertilisers, but rest assured that the Orange will give him a full return for all his work and expense.

The Orange tree possesses a perfectly wonderful capacity for accommodating itself to all kinds of soil which can be irrigated, but the tree grows and bears fruit in proportion to the nature of the soil in which it is cultivated.

Soil composed mainly of siliceous sand with some lime and clay, having a good depth, and capable during the summer of receiving copious irrigation, is what the Orange tree requires for perfection, and prefers to all others. Owing to the friability and depth of this sort of soil the roots easily spread out and develop themselves, thus assisting the growth of the upper part of the tree; ploughing, &c., is easily accomplished (the plough penetrating well into the soil without severe labour), and water is quickly absorbed without leaving those stagnant puddles which so often cause diseases to the roots.

This soil, which I consider to be the best for the Orange tree, is valuable principally for its physical properties and, in a lesser degree, for its chemical composition. In its natural state it is poor, and on this account, in order to keep up with the requirements of nutrition, we should add a regular quantity of fertiliser. This, together with the cost of irrigation, causes heavy expenditure, but the Orange tree is a grateful and generous plant and repays liberally, producing large quantities of excellent fruit. In clayey soils the Orange tree does not grow so large, frequently remaining like a shrub, and the fruit is neither so large and fine, nor so sweet and fragrant. Too much lime produces almost similar results.

In order to fix on the right fertiliser and to use it correctly one must be acquainted with the composition of the plant, its necessities, the

quantity and condition of its products, the composition of the soil and the class of vegetation upon it. By these means we may know with an absolute certainty what elements should be employed and in what quantities.

The calculations and studies which I have made in order to become thoroughly acquainted with the composition of the Orange tree cannot be applied in every case, since it is known that the growth and production vary very much.

In order to treat of this important subject scientifically and with a knowledge of cause and effect, we will make use of the average result of many analyses I have made of trees under very different conditions, which result will serve as a guide, with sufficient exactitude, for the rational application of manures.

#### AVERAGE OF ANALYSES OF THE ORANGE TREE.

In 100 parts.

	Nitrogen.	Phosphoric Acid.	Potash.
Fresh fruit . . .	0.38	0.40	0.38
„ leaf . . .	0.70	0.10	0.38
„ wood . . .	0.70	0.50	0.73

From the fruit, leaf, and wood, all being freshly gathered, one obtains respectively 3.21, 6.00, and 7.00 per cent. of ashes.

In the case of evergreen trees of slow growth, like the Orange, and which are subject to very limited prunings or thinning out of the secondary branches, the fertilising elements consumed in the formation of the foliage and wood are very slight, consequently no account need be taken of them in calculating the composition of the manure. By far the greater part of such elements being used in the production of the fruit, to properly fertilise we must fix our attention principally on the quantity of fruit the tree produces in order to calculate the fertilising materials which will have been taken out of the soil, and in this way deduce what it is needs replacing.

Supposing that a hectare of orange grove (2.471 acres), with about 250 trees, produces 30,000 kilos. (66,120 lb.) of fruit, according to the above analysis the crop contains :—

Nitrogen . . .	114 kilos. (251½ lb.)
Phosphoric acid . . .	120 „ (264½ „ )
Potash . . .	114 „ (251½ „ )

and it will be necessary to return the above elements to the soil in one form or another if one wishes that the trees should not give way for want of nourishment, nor leave off yielding an abundant crop of good quality. Bearing in mind the aforesaid figures, the theoretical formula of a perfect chemical fertiliser for the Orange per hectare (2.471 acres) will thus be :—

Nitrate of soda . . .	760 kilos. (1,675 lb.)
Superphosphate of lime . . .	705 „ (1,554 „ )
Sulphate of potash . . .	225 „ ( 496 „ )

It is clear, however, that this formula cannot be rigidly adhered to ; it

must be modified in each particular case, in accordance with the composition of the soil and the nature of the vegetation of the orchard. The formulæ which will be given further on are based on this, and modified in accordance with the experience of some years.

It is necessary first to find out the composition of the soil. This presupposes a delicate analysis which only a chemist can make, and although it may involve a little expense, the certainty one obtains of applying the exact fertilisers which the tree requires, without adding elements which might possibly be prejudicial or at least wasted, compensates with interest for such expense.

In default of the above analysis, a knowledge of the physical qualities of the soil is to a certain extent useful. A clayey soil presupposes richness in potash and poverty in phosphoric acid; a limy soil is, on the contrary, generally rich in phosphoric acid and poor in potash. Sandy soils are nearly always poor in all fertilising materials, and the soils charged with organic matter contain a sufficient amount of nitrogen. Consequently the formula must be slightly modified in accordance with the quality of the soil, adding or diminishing the elements in which it is deficient or abundant.

To appreciate the effect of a fertiliser it is also necessary to bear in mind the nitrogen that the soil absorbs from the air and renders soluble.

With regard to potash it must be remembered that the Orange tree, like many other plants, is capable of absorbing large quantities of it without the increase of absorption being shown by an increase in the crop or improvement in the quality of the fruit. With potash there is the same result as with soda and lime. In a soil containing, for example, common salt (in such limited quantity as to permit horticultural operations), the plants grown therein absorb soda in abundance, and soda must not be imagined on this account to be an essential element; for the same plants in a soil wanting in chloride of sodium will make luxuriant growth without the absorption of the smallest quantity of the said element. The Olive, for example, when grown in a limy soil, absorbs large quantities of lime and thrives well. Nevertheless, I have seen very luxuriant Olive trees in soils containing hardly any lime, and the analysis of the different parts of the tree showed very slight quantities of oxide of calcium.

When once the manurial necessities of the plant regarding potash are satisfied, if the roots find more at their disposal, they continue absorbing it and depositing it in the green organs, where by accumulation it acts mechanically, as lime and silica would operate, in making the mineral covering of an organic structure.

Besides it must not be forgotten that a great number of soils contain an abundance of potash, and that in order to utilise the same it is only necessary to reduce it to a state fit for absorption, using for this purpose gypsum, green copperas, or other organic fertilisers. And all this naturally suggests a diminution in the quantity of potash referred to in the previously mentioned formula.

The fertilising materials have very varying effects on the Orange, and it is necessary to be acquainted with these effects in order to apply the fertilisers according to the requirements of the market, or to attain the desire of the grower. An excess of nitrogen produces an exuberant growth

of wood and foliage, which uselessly deprive the soil of mineral salts, whilst the resulting fruit is very coarse and thick-skinned, with little sugar or aroma and of bad keeping capacity. The time of ripening is also retarded, and it is necessary to consider whether this is or is not convenient. If, on the contrary, phosphoric acid is too abundant, the fruits are small but numerous, well flavoured and aromatic, with thin skins and poor pulp. When potash is superabundant, the tree does not grow very large, but the fruit is juicy, sweet, and of pleasant flavour. Accordingly, none of these three elements takes the place of a complete fertiliser: they complement each other; they counteract each other's bad qualities and bring out the good; and if used together, and in proper proportions, they produce the desired result.

The general formula has been fixed for the use of large trees in full bearing, and taking for basis a crop of 30,000 kilos. (66,120 lb.) per hectare (2·471 acres). But if the plantation is in a condition to produce more by reason of its age, growth, kind of soil, and abundance of water, or because of the trees being naturally heavy bearers, or on account of the situation, climate, &c., there is no objection to increasing the quantity of fertiliser until you find out the limit of production. But if the plantation naturally produces small crops, has moderate-sized trees, and above all is not sufficiently irrigated, the same formula should be employed but in lesser quantity, and in the selection of this quantity is shown the good judgment of the grower.

If the tree is not in full growth, the formula is modified. Later on will be given special formulæ for young and old trees, for rickety trees, for those of much leaf and little fruit, for those afflicted with gum disease, and for those in the nursery.

As a nitrogenous fertiliser, either sulphate of ammonia or nitrate of soda may be used. Roughly speaking, no preference can be given to either, and you may choose whichever is the more convenient for the land you possess. The sulphate of ammonia is successfully used in light soils and in those charged with organic matter; the nitrate of soda is well applied to heavy soils. As will be indicated later, it is desirable to make use of both these forms of nitrogen. Of the phosphate fertilisers the preference is given to superphosphate of lime, and only in gypseous soils and those humid and rich in organic residues (low-lying lands and banks of lakes or rivers) should the phosphate 'Thomas' be employed. Amongst the potash salts you may use indifferently the sulphate or the chloride; however, the sulphate appears to give more delicacy and fragrance to the fruit. In rather liny soils the use of sulphate of iron is beneficial. In those with little lime, and especially if inclined to be rough and clayey, the use of gypsum will produce excellent results. It should be remembered that the Orange tree is a great absorber of lime, and that under normal conditions a good crop of Oranges extracts from the soil about 250 kilos. of lime (551 lb.) per hectare (2·471 acres). It is clear that if the soil is poor in lime, the roots find great difficulty in obtaining this absolutely necessary quantity of lime. Apart from this, copperas as well as gypsum operates as a corrective of the soil, setting the otherwise inactive potash at the disposal of the plants.

Though the Orange tree may produce large crops by the use solely of

mineral fertilisers, it is well not to omit some organic manure as well, even as a kind of fill-up-the-time fertiliser. It is a very commendable practice to alternate the chemical manures with the organic.

While the great majority of trees remain in a lethargic sleep during the winter season and return to life with the gentle warmth of spring, the Orange tree remains green all the year, and consequently always has its sap in movement. The nourishment of the tree should therefore be continuous. The employment solely of chemical manures results in the tree finding at its disposition a great quantity of nutritive material in an easily assimilable form, and as the irrigation water is seldom absent (that being the *sine quâ non* of a plantation), the roots absorb these food materials with great avidity. When they are used up, the tree shows itself weak for want of food, and to avoid this result it is necessary to place within its reach fertilisers of slow decomposition, such as the organic manures, in order that it may receive its fertilising elements by slow degrees. By this means the tree is continuously fed, and only when it is necessary to reinforce its energies for the production of a large crop does one apply the chemical fertiliser, which is quickly absorbed and produces the desired effect.

General formulæ of fertiliser for the Orange tree per hectare (2·471 acres) :—

#### YOUNG TREES.

{ Sulphate of ammonia . . .	300 kilos. (661 lb.)
{ or nitrate of soda . . .	375 „ (827 „ )
Superphosphate of lime . . .	300 „ (661 „ )
Chloride of potassium . . .	60 „ (132 „ )
Sulphate of lime . . .	250 „ (551 „ )
Sulphate of iron . . .	100 „ (220 „ )

NOTE.—The use or non-use of gypsum in this formula produces very different results. When gypsum is employed the result is many little branches and much foliage; but the small branches are useless; they have little substance, and the leaves are large and far apart. The sulphate of lime somewhat lessens the expansion given to the plant by the nitrogen; consequently the shoots are not so long, but stronger, stouter, and better formed, and the leaves numerous though of smaller size, closer grown, and more strongly united to the shoots.

Pigeon dung . . .	1,500 kilos. ( 3,306 lb.)
Nitrate of soda . . .	300 „ ( 661 „ )
Superphosphate of lime . . .	250 „ ( 551 „ )
Chloride of potassium . . .	40 „ ( 88 „ )
Sulphate of lime . . .	250 „ ( 551 „ )
Sulphate of iron . . .	100 „ ( 220 „ )
Fish guano . . .	500 „ ( 1,102 „ )
Nitrate of soda . . .	240 „ ( 529 „ )
Phosphate 'Thomas' . . .	150 „ ( 331 „ )
Sulphate of potash . . .	60 „ ( 132 „ )
Sulphate of lime . . .	250 „ ( 551 „ )
Sulphate of iron . . .	100 „ ( 220 „ )

Horse dung . . . .	8,000 kilos. (17,632 lb.)
Sulphate of ammonia . . . .	250 „ ( 551 „ )
Superphosphate of lime . . . .	250 „ ( 551 „ )
Chloride of potassium . . . .	35 „ ( 77 „ )
Sulphate of lime . . . .	250 „ ( 551 „ )
Sulphate of iron . . . .	100 „ ( 220 „ )

When the fertiliser—whichever of the various formulæ here indicated is adopted—contains pigeon dung, sewage, chrysalis of the silkworm, hoofs and horns, codfish or other fish guano, in the following year one must use only the chemical ingredients of the fertiliser in the same quantities as given in the formula adopted; the organic constituents must be omitted. But if the fertiliser has for its base horse dung or green manure, these organic constituents may be omitted for two successive years.

After the two or three years, according to the fertiliser employed, you may again use the complete fertiliser.

#### FOR ORANGE TREES IN FULL BEARING.

( Sulphate of ammonia . . . .	400 kilos. ( 882 lb.)
( or nitrate of soda . . . .	500 „ ( 1,102 „ )
Superphosphate of lime . . . .	700 „ ( 1,543 „ )
Sulphate of potash . . . .	90 „ ( 198 „ )

Except under the special conditions of the soil which make it necessary to decide for the exclusive use of the nitric or ammoniacal nitrogen, it is better to apply both forms of nitrogen. In February 200 kilos. (441 lb.) of sulphate of ammonia, and in June 260 kilos. (551 lb.) of nitrate of soda.

Pigeon dung . . . .	2,000 kilos. ( 4,108 lb.)
Nitrate of soda . . . .	400 „ ( 882 „ )
Superphosphate of lime . . . .	625 „ ( 1,378 „ )
Sulphate of potash . . . .	65 „ ( 143 „ )
Sewage (dry) . . . .	2,000 „ ( 4,408 „ )
Nitrate of soda . . . .	400 „ ( 882 „ )
Superphosphate of lime . . . .	500 „ ( 1,102 „ )
Ashes of vine-cuttings . . . .	250 „ ( 551 „ )
Chrysalis of silkworms . . . .	1,000 „ ( 2,204 „ )
Nitrate of soda . . . .	250 „ ( 551 „ )
Superphosphate of lime . . . .	660 „ ( 1,455 „ )
Sulphate of potash . . . .	80 „ ( 176 „ )
Sardine or other fish guano . . . .	1,000 „ ( 2,204 „ )
Sulphate of ammonia . . . .	300 „ ( 661 „ )
Superphosphate of lime . . . .	550 „ ( 1,212 „ )
Ashes of vine-cuttings . . . .	250 „ ( 551 „ )
Horn and hoof parings (ground) . . . .	700 „ ( 1,543 „ )
Nitrate of soda . . . .	150 „ ( 331 „ )
Phosphate 'Thomas'. . . .	700 „ ( 1,543 „ )
Wood ashes . . . .	200 „ ( 441 „ )

Horse manure . . . .	12,000 kilos.	(26,448 lb.)
Sulphate of ammonia . .	340 "	( 749 " )
Superphosphate of lime .	675 "	( 1,488 " )
Kainit . . . . .	300 "	( 661 " )
Green manure of Lupin *	10,000 "	(22,040 " )
Sulphate of ammonia . .	340 "	( 749 " )
Sulphate of potash . . .	60 "	( 132 " )
Superphosphate of lime .	670 "	( 1,477 " )

\* One obtains approximately this amount by sowing a hectolitre (22 gallons) of seed and ploughing the crop in at the time of flowering. At the time of turning the green manure under, one spreads about 400 kilos. (882 lb.) of slaked lime per hectare.

#### OLD ORANGE TREES.

In old trees one frequently notices only a small amount of fresh growth and of fruit-buds, and this is due to the vegetable organism experiencing a kind of anæmia. Greedy, as the Orange is, for potash and lime, and being generally able to absorb immense quantities of these elements from having such an enormous root-spread, it accumulates an excess of these elements in its tissues, depositing them principally in the leaves and young branches, and there forming a kind of mineral network, at times so thick as to impede the circulation of the sap. The tissues become mineralised to excess, almost petrified, and this is an obstacle to the proper life of the plant. It is well in such cases to apply a fertiliser in which nitrogen and phosphates predominate; the first to accelerate the movement of the sap, and the second to promote the formation of new cells, and consequently that of new tissues, at the same time facilitating flowering and fructification. When the new tissues have gained a predominance over the petrified ones, the vital activity is strong, and the tree grows again under normal conditions.

Manganese applied as fertiliser, in the same way as sulphate of iron, on finding itself in the sap exercises its oxidising action, and thus accelerates and increases still more the physiological work of the plant.

With regard to potash fertilisers it is necessary to be very sparing.

On account of all these considerations I consider that the fertiliser for old trees should be made up as follows: -

Sulphate of ammonia . .	300 kilos.	( 661 lb.)
Nitrate of soda . . . .	400 "	( 882 " )
Superphosphate of lime man- ganese (say calcium of manganese) . . . .	800 "	( 1,763 " )
Sulphate of iron . . . .	300 "	( 661 " )
Chloride of potassium . .	25 "	( 55 " )

In the medium clayey soils the potash fertiliser should be omitted.

Pigeon dung . . . . .	3,000 kilos.	( 6,612 lb.)
Sulphate of ammonia . .	200 "	( 441 " )
Nitrate of soda . . . .	400 "	( 882 " )
Superphosphate of lime manganese	700 "	( 1,548 " )
Sulphate of iron . . . .	200 "	( 441 " )

## FULL-GROWN ORANGE TREES OF UNHEALTHY GROWTH.

Sulphate of ammonia . . . .	250 kilos. ( 551 lb.)
Nitrate of soda . . . .	300 „ ( 661 „ )
Superphosphate of lime man- ganese . . . . .	700 „ ( 1,543 „ )
Kaunit . . . . .	100 „ ( 220 „ )
Sulphate of iron . . . .	200 „ ( 441 „ )
Horse manure . . . . .	12,000 „ (26,446 „ )
Sulphate of ammonia . . . .	160 „ ( 353 „ )
Nitrate of soda . . . . .	300 „ ( 661 „ )
Superphosphate of lime man- ganese . . . . .	625 „ ( 1,378 „ )
Sulphate of iron . . . .	200 „ ( 441 „ )

NOTE.—When the tree has recovered and is in a condition to bear fruit normally, the use of this fertiliser must be discontinued, using in its place one of the formulæ that have been mentioned for Orange trees in full production. Before using either of these two formulæ, it would be well to try a good liming, unless the soil is naturally limy.

## ORANGE TREES WITH MUCH WOOD, LEAF, AND FLOWER, BUT LITTLE FRUIT.

It is a not uncommon disappointment for Orange trees to have a strong, beautiful, and almost luxuriant growth without these promising signs being materialised in fruit.

There are varieties of the Orange which are very shy bearers, useless, in fact, as fruit producers, because all their expanse of foliage is nothing but a misleading illusion deceiving the grower with vain hopes of a good return. To such trees manuring does little good, because they are not naturally bearers. As we improve breeds of animals by crossing, so we correct trees of a bad variety by budding or grafting. After budding the trees are manured in the ordinary way.

But there are cases, not a few, in which the tree leaves off fruiting without it being possible to attribute this natural or congenital barrenness to the variety, since similar trees under other conditions give abundant crops. In such cases the defect is due either to a deficiency of nutrition, or to a deficiency of the phosphates which promote the fecundation of the ovary of the flower, or to the exaggerated predominance of nitrogen, which by excessively expanding the sexual organs of the flower produces its abortion. Whatever be the cause, we must employ a fertiliser in which phosphates predominate. Nitrogen should be applied in small quantities, and if the leafage is excessive it may be omitted altogether. The use of sulphate of lime is beneficial, because the tree absorbs the greater part of the lime which, mineralising the tissues, modifies the excessive growth of the green organs, and makes the sap, now enriched by the phosphates, direct itself to the flowering parts or to the

fruit-bearing branches. On account of these considerations I recommend the following formula of chemical fertiliser per hectare (2·471 acres) :—

Sulphate of ammonia	. . .	75 kilos. ( 165 lb.)
Nitrate of soda	. . .	75 „ ( 165 „ )
Superphosphate of lime	. . .	1,000 „ ( 2,204 „ )
Kainit	. . .	900 „ ( 661 „ )
Sulphate of lime	. . .	900 „ ( 661 „ )

NOTE.—The sulphate of lime is put on in February.

#### ORANGE TREES SUFFERING FROM GUMMING.

Nitrate of soda	. . .	400 kilos. ( 882 lb.)
Phosphate ‘ Thomas ’	. . .	800 „ ( 1,763 „ )
Ashes of vine-cuttings	. . .	900 „ ( 1,984 „ )
Sulphate of iron	. . .	200 „ ( 441 „ )

NOTE.—The use of organic fertilisers, and especially horse manure, should in this case be absolutely forbidden.

#### ORANGE NURSERY.

Per each area (120 square yards) : —

Horse manure	. . .	800 kilos. ( 661 lb.)
Nitrate of soda	. . .	40 „ ( 88 „ )
Superphosphate of lime	. . .	15 „ ( 33 „ )
Ashes	. . .	25 „ ( 55 „ )
Sulphate of lime	. . .	20 „ ( 44 „ )
Sulphate of iron	. . .	3 „ ( 7 „ )

For the seed-bed it is only necessary to use horse manure freely.

The cultivation of the Orange requires a deep annual ploughing, when the organic fertilisers, sulphate of ammonia, phosphates, and salts of potash are ploughed in.

Frequently this ploughing is done after the gathering of the crop in November or December, but some growers, from choice or necessity, leave their Oranges on the trees until the beginning of spring, in which case the ploughing should be done at the latest in February. The best time to plough and to apply the said fertilisers is during the first half of February.

By mixing the phosphate ‘ Thomas ’ or ashes with organic fertilisers or with sulphate of ammonia it should be borne in mind that more or less ammonia will be set free. In order therefore to avoid this waste of ammonia it is well to use the ashes and phosphate a few days later. The other components of the mineral fertiliser which is used in the winter may be mixed with impunity.

In treating plantations where the trees are only half-grown the manure should be placed under the spread of the trees but without touching the trunk, say within a hand's-breadth all round. But if the trees by their closeness or size completely cover the surface of the ground the fertiliser may be spread wholesale, excepting the round holes around the trunks, into which neither water nor manure should be allowed to enter. The

fertility produced by those manures is soon shown by the appearance of the tree, whose brilliant dark green foliage raises great hopes.

The nitrogen of the sulphate of ammonia excites the movement of the sap and directs its action to the green organs of the plant, producing the growth of the wood and foliage. But at the same time that this nitrogen is absorbed there is also absorbed, although more slowly, the phosphoric acid of the superphosphate, and this phosphoric acid is concentrated in the vessels which afterwards produce the flower buds. Phosphorus attracts nitrogen; therefore the phosphoric components of the plant tend to unite with nitrogenous components, and in this way nitrogen, which naturally prefers to remain in the leaf organs, passes on to the flower buds, contributing in union with phosphorus to nourish the incipient organs. Potash gives consistency to these organs and regulates, like phosphorus, the process of their formation.

After the absorption of these elements of fertility there is in the interior of the plant, movement, work and effort, which cause a kind of collapse, a failing of the organic functions, in the same way that animals suffer from a prostration of the vital forces after a nervous crisis or the excessive use of any particular organ. What contributes to this faintness of the plant is the fact that the nitrogen, invited by the phosphorus, abandons its position in the green organs and goes to the floral vessels to assist with the other elements of fertility in giving splendour to the feast of flowers. The sweet caresses of the sun announce the spring-time, and the tree prepares to honour nature with its offering of flowers and scent; an offering which, though repeated yearly, always appears new, always varied, and always grand. Amongst the foliage, with its depth of different shades of green, appear white garlands and little branches of Orange blossom, which, bursting with pride, show the golden stamens imprisoned within them. To the feast of flowers succeeds that of love; the Orange blossom celebrates its nuptials caressed by the ardent and voluptuous kisses of the spring sun. The sexes assert themselves and fecundation takes place; the plant has fulfilled Nature's law for the reproduction of the species.

When manures are applied in the proper proportion and at the time mentioned, first the flowering, then the fecundation of the flowers, and lastly their fructification, all take place under healthy conditions, and the tree produces an excellent crop. In the contrary case there is much risk of losing the crop. If the fertiliser is applied later than I have mentioned its effects coincide with the flowering, the sap rises with hasty and impetuous ardour, the generating organs obtain an unequal or disproportionate growth, and the fecundation is bad or else non-effective. Consequently the flowers prove abortive.

There is still another point. The minute grains of pollen are formed of two cells: one of them fecundises the nucleus of the embryonic sac and produces the embryo or germ of the seed; the other cell, heavily charged with phosphorus, fecundises the matter surrounding the egg and gives birth to the albumen, the food which is provided for the use of the embryo. One cell therefore nourishes itself at the expense of the other. If the tree has not before flowering absorbed sufficient phosphates, of the two twin cells of the pollen grain, one will keep its power of fecundity, but

the other, for want of phosphorus, will be sterile, and when the pollen grains fall off the ovary will be fecundised, but there will be no fecundation of the albumen or food matter surrounding the egg, and the formed embryo will perish in physiological misery for want of food; the flower will be sterile. Truly it is disappointing to see trees covered with foliage and blossoms and afterwards to find that they do not bear fruit.

With the manures applied in February the tree is kept in good form, and is capable of carrying a great number of Oranges even up to the end of June. As the fruit grows larger the tree requires larger quantities of the elements of fertility, and if it does not find them, it drops all the fruits which it cannot properly nourish. For this reason, if the fertiliser is not used at the proper time and in the proper form, the fruit begins to drop in June, and the fine promises made by the tree in May are not fulfilled when it is time to gather the crop. The phosphates and potash that are applied in February remain in the ground with hardly any loss, and the roots absorb them slowly. Contrariwise, the mineral nitrogen is absorbed with fair speed, and in June the plant requires a further supply of nitrogen, not only to nourish the fruit but also to invigorate the tree, and in this way it succeeds in absorbing the phosphates and potash remaining in the ground from the last application. From this we see that it is good to use a nitrogenous mineral fertiliser in June, either sulphate of ammonia or nitrate of soda, according to the nature of the soil. With this reinforcement the fruit is regularly nourished, remaining firmly fixed to its stalk, thanks to the assimilated phosphates and potash.

In soils where sulphate of iron or sulphate of lime can be best employed (see page 343), these products are spread broadcast during the month of July. Of the former should be used 100 to 200 kilos. per hectare (220 to 441 lb. to 2·471 acres), and of the latter 200 to 400 kilos. (441 to 882 lb.).

Some growers apply manures in August, a mistaken practice which should be abandoned, the result being that the growth of the tree during summer is more impetuous, the shoots obtain an exceptional growth and absorb a great part of the nutritive properties of the fertiliser, to the detriment of the fruit. When the first frosts come, these sappy shoots, as tender as they are long and vigorous, suffer greatly and become yellow and drooping, and as a rule never develop into strong and well formed wood. Besides these drawbacks to the wood and foliage, the fruit is slow to ripen, and often remains with the skin of quite a green colour, without changing into the bright and beautiful colour so characteristic of this highly prized fruit. For these reasons I insist that the fertiliser for the Orange tree should be applied in the way I have mentioned, part in February and part in June.

Sometimes, either on account of the situation of the plantation or the need of the grower, or not seldom on account of his caprice, it is advisable to sell the crop in the spring in what is called the second season, and then one should endeavour to retard the ripening of the fruit and to keep it firmly fixed on the branches, so that it may not be beaten down by the wind or rain. For this purpose it is necessary to use a formula of mixed fertiliser. The superphosphate, the organic manure, and half of the potash salt is applied in February; half of the nitrogenous mineral

fertiliser and the remainder of the salt of potash in July; the other half of the nitrogenous fertiliser, together with 400 to 500 kilos. (882 to 1,102 lb.) of gypsum, in September; and ten or twelve days after the sulphate of iron. The gypsum and the sulphate of iron tend to fix the fruit on the tree, and at the same time, by repressing the excessive growth of the wood and leaf, direct a great part of the fertilising elements which might have been monopolised there to the fruit.

If it is desired to hasten the ripening, the application of the fertiliser, usually done in June, should be done at the end of May.

It should be remembered that it is not by the use of a greater quantity of manure that one obtains a larger crop, because as soon as ever you pass the limits which the plant can healthfully assimilate (which are approximately the quantities mentioned in the foregoing formulae, and more exactly those indicated by a chemical analysis of the soil), the excess that we use will not by any manner of means produce the desired result.

#### THE LEMON, CITRON, BERGAMOT, AND LIME.

All the trees comprised in the Citrus group have, with slight variations, the same plant-food requirements; all of them prefer a sweet friable soil of good depth, and moist without being wet.

The Lemon and the Citron require more manure than the other Citrus trees; then follow the Sweet Orange, the Bergamot, the Sour Orange, and the Lime.

In all cases it is necessary to use manures in the same way as described for the Orange, the only modification being to make an increase of 10 to 12 per cent. in the quantity of nitrogenous fertiliser, because the Lemon, Citron, Bergamot, and Lime, and even the Sour Orange, require under equal circumstances a greater quantity of nitrogen than the Sweet Orange.



## REPORT ON THE METEOROLOGICAL OBSERVATIONS MADE IN THE SOCIETY'S GARDENS AT CHISWICK IN 1900.

By EDWARD MAWLEY, Secretary R. Met. Soc.

SINCE the last Report was issued (*see* Vol. xxiii. 391) there has been no change in the position of any of the instruments, and the observations have been taken regularly each day at the same hour as before—9 a.m. I have carefully checked the entries made by the Society's observer, Mr. T. W. Turner, in the Meteorological Register, but have been unable to detect any errors in the observations themselves. Here and there the figures in some of the columns had, I found, been incorrectly added up, which had led to slight inaccuracies in some of the mean values. These inaccuracies have now been set right, and the Society is, I think, to be congratulated upon having a set of standard instruments so exceptionally well placed, and also in having their indications so accurately recorded. In May last I tested all the thermometers, &c., and found them in good working order and reading correctly.

*A brief monthly summary of the observations taken in the Society's Gardens at Chiswick in 1900.*

*January.* - Very warm and very wet. The days were, as a rule, about 3 degrees warmer, and the nights about 2 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass showed 15 degrees of frost.

The rainfall was very heavy, being nearly double the average quantity for the month.

Mean temperature of the air in shade	...	...	...	...	39°·9
Highest	...	...	...	...	53°·5 on the 24th
Lowest	...	...	...	...	25°·2 „ 13th
Lowest temperature on the grass	...	...	...	...	16°·8 on the 13th and 14th

				At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	39°·0	41°·3	44°·3
Highest	...	...	...	43°·1	42°·9	44°·9
Lowest	...	...	...	35°·6	39°·6	43°·5

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... .. 89

Rain fell on 20 days to the total depth of ... .. 2·98 in.

(Equivalent to about 14 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... .. 0·48 in. on the 6th.

On the 28th the ground was covered with snow to the average depth of in.

*February.*—Cold and exceptionally wet. The days were, as a rule, about 1 degree colder, and the nights about 2 degrees colder, than the average. On the coldest night a thermometer placed on the surface of the snow showed 26 degrees of frost.

The rainfall was exceptionally heavy, being more than double the average quantity for the month.

Mean temperature of the air in shade	...	...	...	...	38°·1	
Highest	...	...	...	...	57°·7	on the 26th
Lowest	...	...	...	...	15°·0	„ 12th
Lowest temperature on the grass	...	...	...	...	6°·2	„ 12th

					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	37°·9	39°·5	42°·4
Highest	...	...	...	...	46°·3	44°·5	44°·0
Lowest	...	...	...	...	33°·4	35°·1	40°·3

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... .. 88

Rain fell on 19 days to the total depth of ... .. 3·49 in.

(Equivalent to about 16 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... .. 0·65 in. on the 2nd.

On the 3rd the ground was covered with snow to the average depth of 3 in.

On the 11th the ground was covered with snow to the average depth of 4 „

*March.*—Very cold and dry. The days were, as a rule, about 4 degrees colder, and the nights about 1 degree colder, than is seasonable. On the coldest night the thermometer on the grass showed 18 degrees of frost.

The rainfall was light, being about half-an-inch less than the average quantity for the month.

Mean temperature of the air in shade	...	...	...	...	39°·7	
Highest	...	...	...	...	56°·9	on the 12th
Lowest	...	...	...	...	21°·7	„ 18th
Lowest temperature on the grass	...	...	...	...	14°·4	„ 18th

					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	40°·5	42°·4	43°·9
Highest	...	...	...	...	43°·7	44°·5	44°·1
Lowest	...	...	...	...	38°·6	41°·5	43°·7

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... .. 79

Rain fell on 9 days, and to the total depth of ... .. 0·92 in.

(Equivalent to about 4 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... .. 0·37 in. on the 18th.

*April.*—Seasonable in temperature and dry. The days were, as a rule, about 1 degree warmer, and the nights about 1 degree colder, than is seasonable. On the coldest night the thermometer on the grass showed 14 degrees of frost.

The rainfall was light, being but little more than half the average quantity for the month.

Mean temperature of the air in shade	...	...	...	...	47°·5	
Highest	...	...	...	...	76°·5	on the 21st
Lowest	...	...	...	...	25°·3	„ 2nd
Lowest temperature on the grass	...	...	...	...	17°·5	on the 2nd and 26th

					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	46°·3	45°·9	45°·4
Highest	...	...	...	...	53°·2	50°·3	47°·8
Lowest	...	...	...	...	37°·5	40°·9	43°·3

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... .. 71

Rain fell on 14 days to the total depth of ... .. 0·89 in.

(Equivalent to about 4 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... .. 0·32 in. on the 3rd.

*May.*—Cold and very dry. The days were, as a rule, about 1 degree colder than is seasonable, while the nights were of about average temperature. On the coldest night the thermometer on the grass showed 10 degrees of frost.

The rainfall was very light, being not much more than half the average quantity for the month.

Mean temperature of the air in shade	...	...	...	...	52°·0		
Highest	...	...	...	...	70°·2	on the 27th	
Lowest	...	...	...	...	33°·3	„ 16th	
Lowest temperature on the grass	...	...	...	...	22°·1	„ 16th	
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	53°·3	51°·8	49°·7
Highest	...	...	...	...	58°·2	55°·1	51°·8
Lowest	...	...	...	...	49°·5	48°·4	47°·8
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	...	69
Rain fell on 11 days to the total depth of	...	...	...	...	...	...	1·12 in.
(Equivalent to about 5 gallons on each square yard of surface in the Gardens.)							
Heaviest fall on any day	...	...	...	...	...	0·23 in. on the 24th.	

*June.* Warm, with average rainfall. The days were, as a rule, about 1 degree warmer, and the nights about 2 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass fell to 36 degrees, or 4 degrees short of the freezing-point.

The rainfall was about the average quantity for the month.

Mean temperature of the air in shade	...	...	...	...	60°·1		
Highest	...	...	...	...	86°·4	on the 11th	
Lowest	...	...	...	...	43°·9	„ 27th	
Lowest temperature on the grass	...	...	...	...	36°·2	„ 14th	
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	60°·7	58°·1	54°·4
Highest	...	...	...	...	64°·9	60°·2	56°·1
Lowest	...	...	...	...	53°·0	54°·1	51°·9
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	...	72
Rain fell on 13 days to the total depth of	...	...	...	...	...	...	1·90 in.
(Equivalent to about 9 gallons on each square yard of surface in the Gardens.)							
Heaviest fall on any day	...	...	...	...	...	0·33 in. on the 21st and 25th.	

*July.*—Most exceptionally warm and very dry. The days were, as a rule, about 7 degrees warmer, and the nights about 3 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass fell to 33 degrees, or 1 degree short of the freezing-point.

The rainfall was very light, being less than half the average quantity for the month.

Mean temperature of the air in shade	...	...	...	...	66°·9		
Highest	...	...	...	...	91°·7	on the 25th	
Lowest	...	...	...	...	42°·2	„ 8th	
Lowest temperature on the grass	...	...	...	...	33°·1	„ 8th	
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	67°·4	63°·4	58°·6
Highest	...	...	...	...	73°·5	67°·3	61°·3
Lowest	...	...	...	...	61°·5	59°·5	56°·1

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... .. 63  
 Rain fell on only 6 days to the total depth of ... .. 1.11 in.  
 (Equivalent to about 5 gallons on each square yard of surface in the Gardens.)  
 Heaviest fall on any day ... .. 0.53 in. on the 27th.

*August.*—Seasonable in temperature and very wet. The days were, as a rule, about 1 degree colder than is seasonable, while the nights were of about average temperature. On the coldest night the thermometer on the grass fell to 40 degrees, or 8 degrees short of the freezing-point.

The rainfall was very heavy, being three-quarters of an inch in excess of the average for the month.

Mean temperature of the air in shade	...	...	...	...	61°.4
Highest	...	...	...	...	83°.2 on the 18th
Lowest	...	...	...	...	44°.9 „ 31st
Lowest temperature on the grass	...	...	...	...	39°.5 „ 31st

				At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	62°.9	62°.4	60°.1
Highest	...	...	...	67°.2	65°.2	61°.4
Lowest	...	...	...	59°.2	60°.3	59°.5

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... .. 74  
 Rain fell on 15 days to the total depth of ... .. 3.20 in.  
 (Equivalent to about 15 gallons on each square yard of surface in the Gardens.)  
 Heaviest fall on any day ... .. 0.53 in. on the 23rd.

*September.*—Warm and exceptionally dry. The days were, as a rule, about 3 degrees warmer than is seasonable, while the nights were of about average temperature. On the coldest night the thermometer on the grass showed 2 degrees of frost.

The rainfall was exceptionally light, being less than one-third of the average quantity for the month.

Mean temperature of the air in shade	...	...	...	...	57°.7
Highest	...	...	...	...	81°.0 on the 16th
Lowest	...	...	...	...	39°.3 „ 6th
Lowest temperature on the grass	...	...	...	...	29°.5 „ 20th

				At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	58°.8	59°.4	58°.4
Highest	...	...	...	61°.7	60°.9	59°.3
Lowest	...	...	...	55°.7	57°.9	57°.9

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... .. 79  
 Rain fell on only 6 days to the total depth of ... .. 0.74 in.  
 (Equivalent to about 3 gallons on each square yard of surface in the Gardens.)  
 Heaviest fall on any day ... .. 0.39 in. on the 27th.

*October.*—Warm and very dry. Both the days and nights were, as a rule, about 2 degrees warmer than is seasonable. On the coldest night the thermometer on the grass showed 10 degrees of frost.

The rainfall was very light, being about an inch less than the average for the month.

Mean temperature of the air in shade	...	...	...	...	50°.6
Highest	...	...	...	...	74°.3 on the 8th
Lowest	...	...	...	...	31°.0 „ 16th
Lowest temperature on the grass	...	...	...	...	21°.6 „ 16th

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	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m. ... ..	51°·6	54°·3	55°·6
Highest ... ..	57°·6	57°·5	57°·8
Lowest ... ..	46°·5	51°·3	53°·5
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... ..	...	...	80
Rain fell on 17 days to the total depth of ... ..	...	...	1·73 in.
(Equivalent to about 8 gallons on each square yard of surface in the Gardens.)			
Heaviest fall on any day ... ..	...	0·50 in. on the 29th.	...

*November.*—Very warm and rather dry. The days were, as a rule, 2 degrees warmer, and the nights 3 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass showed 13 degrees of frost.

The rainfall was rather light, being about a quarter of an inch below the average for the month.

	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the air in shade .. ..	46°·2		
Highest ... ..	61°·7 on the 1st		
Lowest ... ..	27°·2 .. 11th		
Lowest temperature on the grass .. ..	19°·4 .. 11th		
Mean temperature of the soil at 9 a.m. .. ..	47°·2	49°·9	52°·1
Highest ... ..	53°·1	53°·1	53°·4
Lowest ... ..	42°·3	47°·0	50°·0
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... ..	...	...	87
Rain fell on 18 days to the total depth of .. ..	...	...	1·78 in.
(Equivalent to about 8 gallons on each square yard of surface in the Gardens.)			
Heaviest fall on any day .. ..	...	0·36 in. on the 16th.	...

*December.* Most exceptionally warm and very wet. The days were, as a rule, about 6 degrees warmer, and the nights about 7 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass showed 10 degrees of frost.

The rainfall was very heavy, being about 1 in. in excess of the average.

	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the air in shade . . . .	45°·0		
Highest ... ..	58°·6 on the 12th		
Lowest ... ..	30°·1 .. 24th		
Lowest temperature on the grass ... ..	22°·0 .. 22nd		
Mean temperature of the soil at 9 a.m. . . .	45°·2	47°·1	49°·3
Highest ... ..	48°·2	48°·5	49°·9
Lowest ... ..	41°·8	45°·3	48°·2
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) ... ..	...	...	89
Rain fell on 16 days to the total depth of ... ..	...	...	2·45 in.
(Equivalent to about 11 gallons on each square yard of surface in the Gardens.)			
Heaviest fall on any day ... ..	...	0·62 in. on the 30th.	...

*The Diagrams.*—The averages with which the different mean monthly temperatures are compared in diagrams 1 and 2 are derived from the observations taken at Kew Observatory during the twenty-five years ending 1895. The actual averages for Kew have not been used, but the

departures in mean temperature, &c., from the monthly means for 1900 at that observatory have been applied to the Chiswick temperatures ; and in this way very close approximations to the true monthly averages have been obtained. Mr. Glaisher's discussion of the Chiswick temperatures, 1826-1869 (referred to in Vol. xxiii., p. 391) was not available for this purpose, as it gives no maxima or minima temperatures. The rainfall averages used in diagram 1 are, however, those given by Mr. Glaisher for the forty-four years ending 1869 at Chiswick.

Diagram 1.—This diagram is intended to show at a glance the general

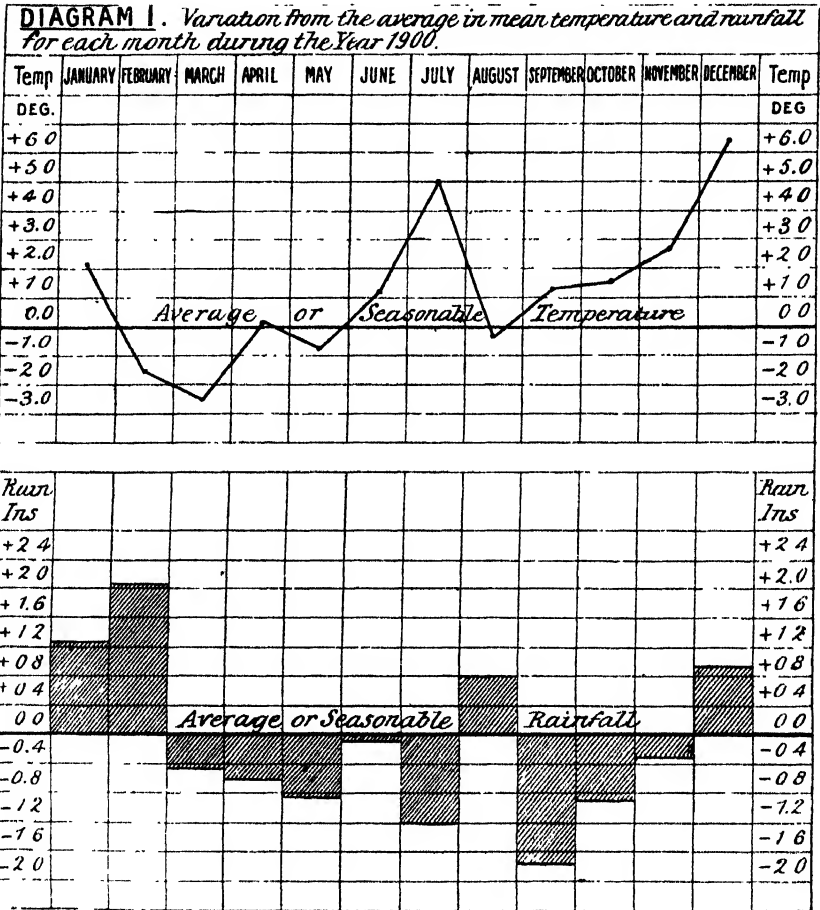


FIG. 168.

character of the weather of each month of the year under discussion as regards temperature and rainfall. For instance, it will be seen that there were only four months—February, March, May, and August—which were in any way unseasonably cold, and that July and December were both, on the other hand, most exceptionally warm. Then, as regards rainfall, it will be noticed that on only four months did the rainfall exceed the average, while all the other months of the year were more or less unseasonably dry.

Diagram 2.—Here the most noteworthy feature is the unusual warmth of the weather in July and December during the daytime. In the latter month the nights were also as exceptionally warm.

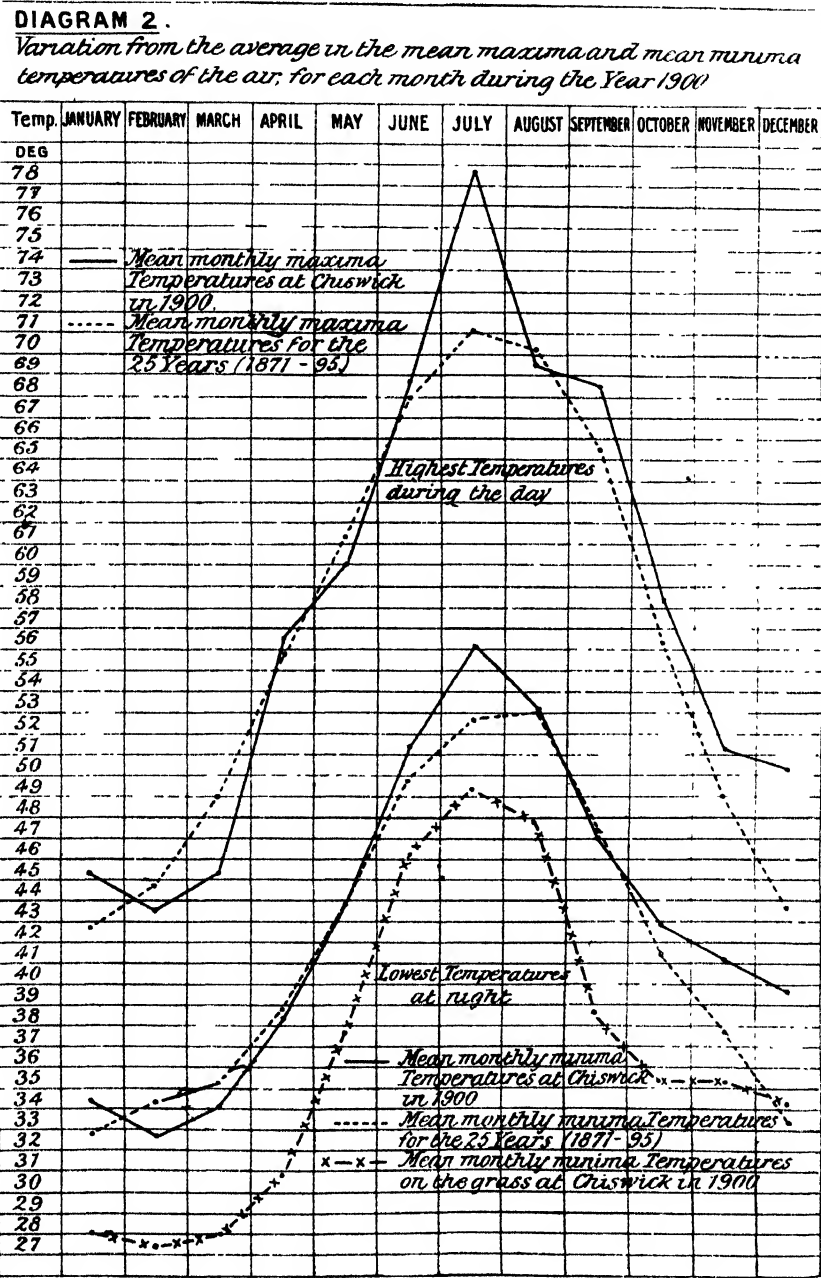


FIG. 169.

Diagram 3.—It will be seen that in the coldest month (February) the soil at 4 ft. deep was 4 degrees warmer than the air, at 2 ft. deep

1 degree warmer than the air, but less than half a degree colder than the air at 1 ft. deep. Whereas in the warmest month (July) the soil at 4 ft. and 2 ft. deep was respectively 8 degrees and 4 degrees colder than the air, but at 1 ft. deep it was about half a degree warmer than the air.

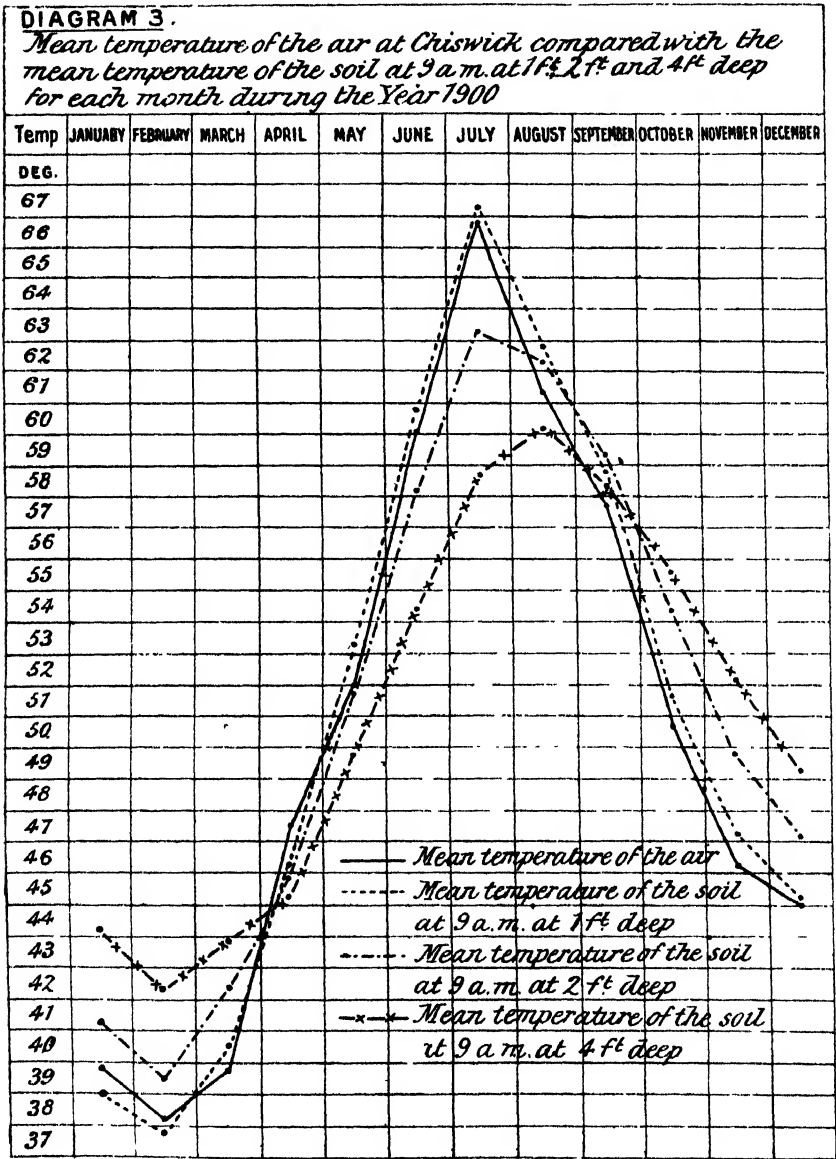


FIG. 170.

THE THERMOMETER ON POST.

At the beginning of the report it was stated that no change had been made in the position of any of the instruments. This statement is correct as regards the standard instruments which form the proper

equipment of this meteorological station, but was not intended to include the unverified thermometer mounted on a post, which has been placed there in order to test the merits of this method of exposing a Six's thermometer for ordinary garden observations.

In May last the Six's thermometer previously in use not having a sufficiently open scale was replaced by a new and larger thermometer of the same pattern. Advantage was taken of this change of instrument to shorten the post, so that the thermometer when in position on the north side of it has now its bulb only 3 ft., instead of as before 5 ft., above the grass in the instrument enclosure. Similar projecting flanges to those previously employed were fastened to the sides of the post in order to protect the thermometer from the sun during the early morning and late afternoon hours. Also, in the same way as before, the instrument is partly sheltered from rain by a sloping piece of zinc secured to the top of the post and projecting over the thermometer.

Since this thermometer was placed in position the highest and lowest temperatures registered by it have been entered daily at 9 a.m. in a little book kept specially for the purpose. But as only entries for eight months are available for 1900 I propose leaving the discussion of this method of observation until my next Report.



## NOTES AND GLEANINGS.

### TOBACCO WASH.

A FELLOW writes asking how to make a Tobacco wash for winter application to trees and vines :

To 1 lb. of Soft-soap dissolved in  
1 gallon of hot water, add  
1 pint of Tobacco juice,

and stir them well up together. This will be found a perfectly safe dressing for Vines or for fruit trees inside or outdoors, always provided that the trees *are at rest*, and not growing. It is most efficacious if applied whilst warm.

### A MONSTER LILY BULB.

A. DOMELER, Esq., F.R.H.S., tells us that three years ago he planted a single bulb of *Lilium speciosum rubrum* in his garden at Sydenham. It was left in the ground, and this year (1900) it had extended to sixteen spikes bearing 150 fine blossoms. The central or parent bulb alone had eleven spikes. Three of the side bulbs were taken off, and were found to be very large indeed, one of them measuring 1 ft. 6½ in. in circumference, and weighed 2 lb. 3 oz. The parent bulb was not lifted, but it appeared to be very much larger still.

### " AFFILIATED SOCIETIES.

THERE are now 120 local Societies affiliated with the Royal Horticultural Society. These Societies will certainly have an average of 200 members belonging to each, which gives a total of 24,000 horticulturists who are reached by the Society's *Journal* and other publications, for each affiliated Society has a copy of the *Journal* to hand round among its members and subscribers. Some of these Societies have club rooms, where they hold weekly or monthly meetings, and it would be a kindly, and probably not an unprofitable, thing if horticultural firms would send a copy of their Catalogues to each of these Affiliated Societies, whose names and addresses will be found on page 132 of the "Report of the Council."

A letter received recently from the Secretary of one of these Societies says : " Our members are all very keen to get the R.H.S. *Journal*, so much so that we have been obliged to impose the limit of a fortnight as the longest any member may keep it."

### RENOVATION OF OLD FRUIT TREES.

It may be read in the Minutes of the Fruit Committee, p. clxxv, how Mr. John Matthews, gardener to Mrs. Maltby, at Botley, in Hampshire.

received a Cultural Commendation for a very fine sample of 'Beurré Diel' Pears. Fig. 171 shows the tree which bore the fruit, the photograph having been taken whilst the tree was in blossom. The tree now covers a wall space of 26 ft. long by 8 ft. 6 in. high. It was originally (before

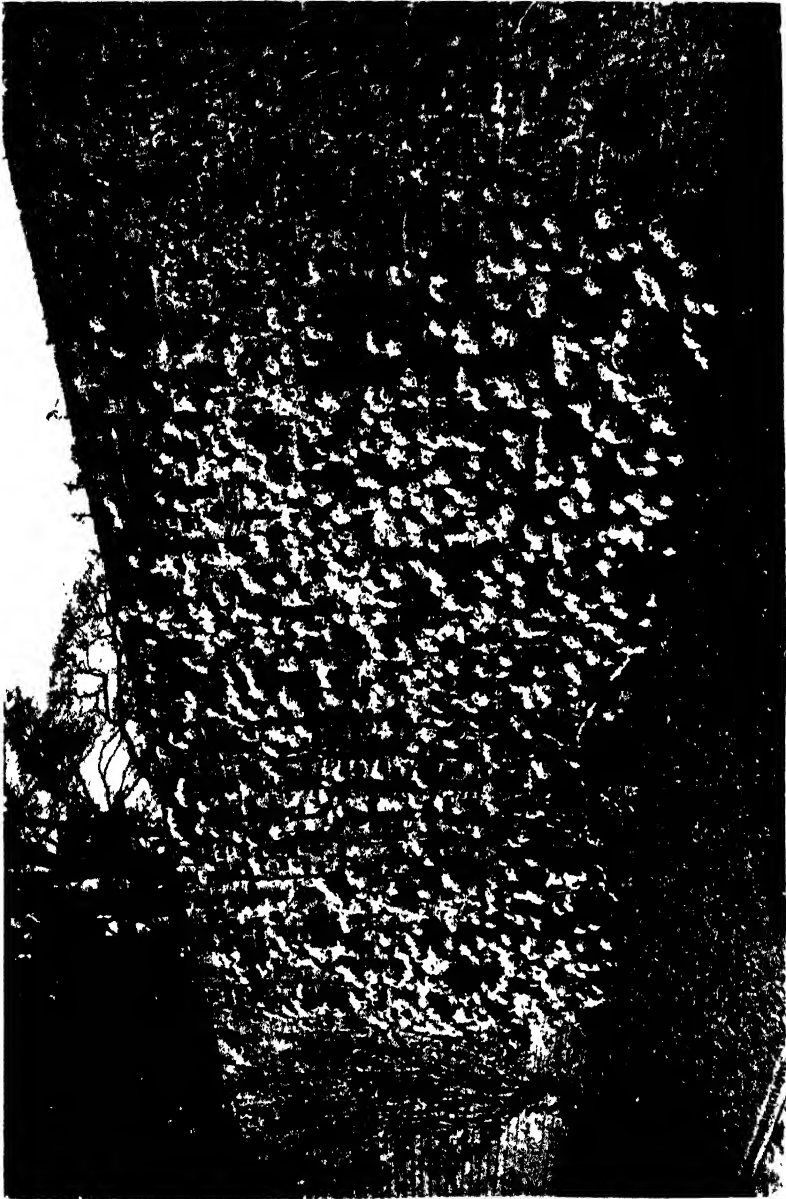


FIG. 171.---RENOVATED PEAR TREE.

Mr. Matthews took it in hand) a very old horizontally trained specimen, bearing very poor, small, cracked fruits, with hardly a single presentable one amongst them; it is now perpendicularly trained, as the figure shows, clothed with abundance of clean, healthy fruit-bearing wood, and bears no cracked fruit.

The treatment adopted to bring it into its present fruitful condition was as follows: At the winter pruning time, all the spurs from the two (right and left) bottom horizontal branches were cut clean away, causing the dormant eyes to break into young upright shoots the following spring. The best placed of these were selected and trained up like cordons, the horizontal branches above them being removed gradually and as necessary to make room for the young upright-growing shoots. When all the old horizontal branches were gone in this way, the main trunk was itself cut off obliquely just above the two right and left bottom branches. It then occurred to Mr. Matthews that if he let the ends of the two main branches down into the ground they might root, and so supply greater vigour to the extremities. So he cut a few notches on the under side of the main right and left branches, and let them down into the ground, as may be noticed in the figure, and trod the soil down firmly upon them. The result has more than answered his expectations. The tree has rooted all along the branches, and has thus been placed on what may be called a dual basis of support. Mr. Matthews intends now to continue his experiment by gradually cutting away all the old roots, to within a foot or so of the trunk, and then to burrow under it and let it down, so that the two horizontal branches may be their whole length below the soil and form fresh roots, instead of only at the ends, and it will then, he thinks, be possible in a year or two to cut away the whole of the old trunk and roots altogether, and make the tree entirely depend upon its newly formed fibrous roots.

By this method old trees may in a few years be made young again in root and branch, and brought into first-rate condition without any (or comparatively any) loss of crop, for by only cutting away the old horizontal branches one or two at a time, those that are left will bear a crop of fruit at least as good as they would otherwise have done; and by the time they have all been removed the young wood will be in fruiting condition.

### THE BOTTLING OF FRUIT.

In many and many a country house during the marvellously prolific fruit season of the year 1900 the housekeeper must have wished for some quick and simple, but effectual, method of bottling and preserving all the surplus fruit. There are, of course, various methods. In Vol. xx., pp. lv, lvii, and in Vol. xxi., p. 121, attention was drawn to an admirable invention of Messrs. De Luca, of 6 Long Lane, Aldersgate Street, London, which received Bronze and Silver Medals from the Society, and which took the form of an automatically self-closing bottle, a method which allowed the heated air and steam to escape from the bottle as long as it was in the cooking pan on the fire, but sealed it up hermetically as soon as the bottles were taken out of the hot water and began to cool. For this is the chief necessity to ensure the keeping of the fruit, that the air, when once expelled from the bottles by the heating, shall not be allowed in the smallest possible degree to get back into them again: one atom of re-entering air is sufficient to make the whole bottleful mildew and decay.

On December 18 the Fruit Committee recommended another Banksian Medal (see p. cxciv) to another system invented by Messrs. Lee, of Knight-rider Street, Maidstone. The figs. 172 and 173 show the apparatus as made for domestic uses, but larger appliances are manufactured for trade purposes. The apparatus consists of a specially constructed steamer or

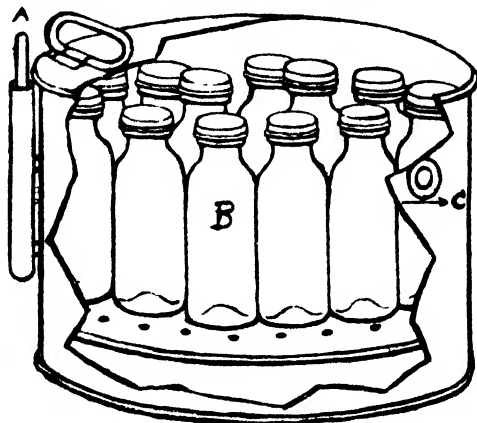


FIG. 172. USED WITH WATER.

boiler, fitted with a thermometer, and may be used either with water to boil, as in fig. 172, or steam may be passed into it from a patent kettle, as in fig. 173. The thermometer shown at the left-hand side of the cooking pot records the temperature of the bottles and their contents inside, and the success of the bottling depends absolutely on these two points: (1) the destruction of every germ of mildew, &c., by keeping the bottles at a certain temperature for a certain time; and (2), as already mentioned, the absolute prevention of any possible re-entry of air into the bottles afterwards, for which purpose the bottles must be hermetically sealed whilst

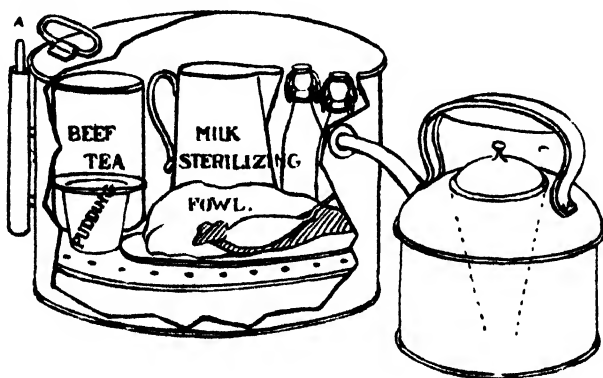


FIG. 173.-- USED WITH STEAM.

they are still enveloped in the steam or standing in almost boiling water. The heat may be applied by an ordinary kitchener, or, preferably, by an oil or gas stove, when, as in fig. 173, the steam kettle is used. The fruit may be preserved with or without sugar, and when properly done will keep perfectly good and fresh for years.

The fruit that is to be used must, of course, be fresh and good, and the bottles clean. The fruit is first packed into the bottles, which are then filled up to the neck with cold water, or, if preferred, with thin syrup, made by dissolving half-a-pound of loaf sugar in hot water and leaving it to cool. The bottles are then put into the cooking pot, where they must remain for certainly not less than two hours at a temperature of between a minimum of 145 degrees and a maximum of 160 degrees. This low sterilising temperature being maintained for two, three, or four hours will destroy all germs without cooking the fruit, and is the great secret of successful bottling. No actual harm is done by the heat rising above 160 degrees, but if it does the fruit will probably burst and lose its shape and not look so nice; but for cooking purposes it is much the same.

Vegetables may be preserved in exactly the same way, except that they must be done twice over with an interval of 24 hours between to allow of their becoming quite cold. Jams and fruit jellies and marmalade and a host of other things can be preserved fresh and good for years in the same way, as it not only avoids the possibility of mildew and fermentation, but also prevents crystallisation.

#### GARDEN SEATS.

A FELLOW wishes for advice as to what seats to adopt in his garden. "Which are the least objectionable? Which are the best suited to the general surroundings?" It is a difficult question to answer, as, to such a very great extent, it depends upon (1) the likes and dislikes of the individual, and (2) the style of garden in which the seats are wanted. Still,



FIG. 174.

most people would agree that, however convenient the hybrid wood and iron seats so generally adopted—wooden rails on 8-shaped iron supports at either end—may be, they are in themselves terribly ugly, and harmonise not at all with a naturally treated garden. On the other hand, what are called "rustic-work" seats are either immovable or so heavy as to be practically so; and we are not quite sure whether the "make-believe" of

the rustic work does not offend as much as its rusticity pleases. Seats made of hewn stone, after the style one sees in Alma Tadema's pictures of Roman country life, are, no doubt, very beautiful, especially after they have put on garments of lichen and moss, and they may be entirely suited to a Roman climate, and partly so, as adjuncts to a grand old palatial building; but for the ordinary English garden and climate they are very chilly and chilling to sit on, and are almost too grand for general use. Then there are terrible things made to resemble gigantic toadstools—from which abominations the Fates defend us in any garden that we love.



FIG. 175.

On the whole we think we prefer the old-fashioned, though formal, settle of Queen Anne's time, of which figs. 174 and 175 are very good examples. But what colour should they be painted? We have no doubt they were white in the good Queen's days, but we confess towards a hankering after duck's-egg green or Seakale-leaf green, which is a capital colour for verandahs and all garden wood-work. They should, however, be painted a shade darker than a Seakale leaf, as green always fades a little.

#### THE GLASTONBURY PEAR.

*Synonyms* : - 'The Doctor,' 'Edgarley Foundling,' 'Benedictine,' 'Beurré d'Avalon,' 'Porch's Beurré,' 'Burgess's Pear.'

At various times and by various authorities it has been identified with 'Beurré du Roi,' 'Brown Beurré,' 'Esperine,' 'Coalpit Heath Pear,' 'Beurré Hardy.'

In the earliest record we can trace the Pear was locally called 'The Doctor,' and was by one of its earliest known cultivators considered synonymous with the French 'Beurré du Roi.'

November 16, 1865.—Dr. Hogg received it from Mr. Porch, of Edgarley, who thought "the tree must be a wild one, as it is of great age and is growing in a hedge surrounded by Elms," and Dr. Hogg, imagining that it grew at Edgarley, described it under the name of 'Edgarley Foundling.'

February 1871.—Mr. Sampson, of Yeovil, speaks of a new Pear, 'Benedictine,' "raised by Wm. Lovell, Esq., of Glastonbury, from

Huyshe's 'Prince of Wales' x 'Van Mons Léon Leclerc.''' Now if this statement had been correct (as Huyshe's 'Prince of Wales' was not sent out till 1859) it is obvious that 'Benedictine' could not be identical with the 'Edgarley Foundling' described by Dr. Hogg in 1865. There would not have been possible time for it to have been raised.

November 1871.—Mr. Scott received it from Mr. Sampson, and described it under the name of 'Benedictine.'

November 7, 1871.—Dr. Hogg received from Mr. Sampson fruits of his 'Benedictine,' "which is said to be identical with 'Edgarley Foundling,' but which appears to me (Dr. Hogg) distinct . . . very much resembling 'Brown Beurré.'"

November 1871. - Mr. Cramb considers it identical with 'Brown Beurré.'

December 28, 1871. Mr. Thomas Rivers makes it synonymous with 'Esperine' of Van Mons.

January 18, 1872. - Mr. Rivers states that 'Edgarley Foundling,' 'Benedictine,' and 'Coalpit Heath Pear' are all synonyms of 'Esperine.' It was, however, afterwards pretty clearly proved that Mr. Rivers was mistaken.

January 25, 1872. Mr. Porch, of Glastonbury, reports that 'Benedictine' and 'Edgarley Foundling' are undoubtedly the same, and could not be synonymous with 'Esperine,' as 'Esperine' was not distributed in England till 1850, whereas a resident in Glastonbury had known the original tree of 'Benedictine' as long ago as 1812. Mr. Porch also says that Mr. Lovell obtained grafts in 1862 from Mr. Chapman, who had grown it for many years against a wall, the original tree standing in a hedge at the back of St. John's Church, and that Mr. Sampson obtained them from Mr. Lovell. Mr. Porch objects to Mr. Sampson naming it 'Benedictine,' and says, "Until it is identified, I suggest it be called 'The Glastonbury Pear,' a title which it has a right to, and by which it is known in the neighbourhood."

February 1, 1872. - Mr. Lovell writes absolutely denying Mr. Sampson's statement that he raised the Pear from seed.

February 8, 1872.—Mr. Porch comes round to Mr. Cramb's opinion that 'The Glastonbury Pear,' 'Benedictine,' 'Doctor,' or 'Edgarley Foundling,' whichever name it be called by, is identical with 'Brown Beurré,' and adds that Mr. Chapman (who really does appear to have been the *fons et origo* of 'The Glastonbury Pear' at Glastonbury) had for many years called it 'Beurré du Roi,' which is a synonym of 'Brown Beurré.'

October 29, 1900. - Mr. Porch writes: "On examining the old tree in the hedge behind St. John's Church, I found there were two varieties of Pears upon it. . . . The original tree has now disappeared." He also suggests it should be called 'Beurré d'Avalon of Glastonbury,' apparently abandoning his 1872 opinion that it was 'Brown Beurré.'

November 12, 1900. - Mr. Charles Tudway, of Wells, who showed the fruits which were certificated by the Fruit Committee on October 23, 1900, says of it: "The original Glastonbury Pear tree grew from a seed in Mr. Burgess's garden at Glastonbury over fifty years ago. For many years it was called the 'The Burgess Pear.' After Mr. Burgess's death his house was bought by Mr. Bishop, whose widow lives there now, and she says the old tree is still in her garden, and this year (1900) had 50 Pears upon it.

Such are the difficulties experienced in tracing the origin and name of a Pear for only fifty years !

A figure of the Glastonbury Pear will be found on page clxxxvi.

#### NEW HYBRID SUNFLOWER.

MANY will think there are enough single Sunflowers already, and yet we welcome this one cordially, as we hope it will bear out its promise, which



FIG. 176. --*HELIANTHUS H. G. MOON.* (*The Garden.*)

is—to be as good a flower as ‘Miss Mellish,’ and at the same time free from the too aggressive tendency of that lady to be always running away from home and establishing colonies at two or three yards’ distance. The

new 'H. G. Moon' (fig. 176) is a hybrid or cross between *Helianthus multiflorus*, the common perennial Sunflower, and *Helianthus rigidus*, generally called hitherto *Harpalium rigidum*, but now grouped with *Helianthus*. 'Miss Mellish' is by far the best of the *H. rigidus* type, and 'H. G. Moon' will, we hope, prove the forerunner of a race intermediate with it and the *H. multiflorus* type, of which *H. m. maximus* is the best at present.

### THREE COMMON GARDEN IRISES.

(1) MANY people experience no little trouble in the cultivation of the common Iris (and its varieties), known under various other names as

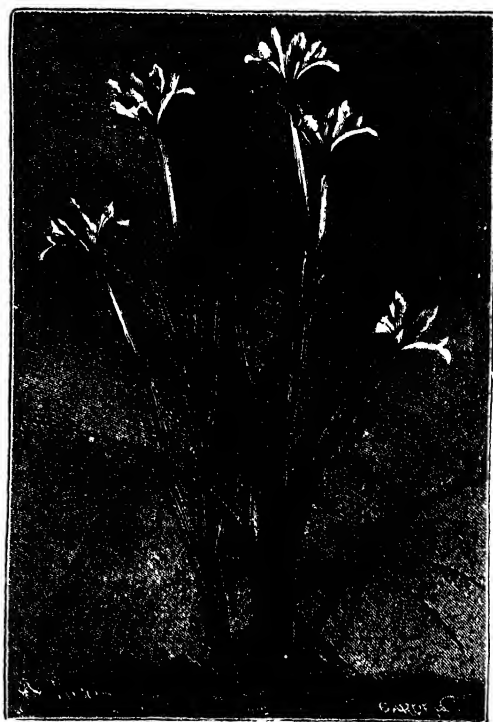


FIG. 177.

Flour-de-lys, German Iris, Bearded Iris, &c. It is one of the few plants which do not seem to mind the smoke of London, probably from the fact of the leaves all standing erect, and thus not accumulating such a dense coating of London smoke deposit as is the case with leaves which stand out more or less horizontally. But though it will grow in London, many gardeners say they "cannot do German Irises." The reason is that there is a deep-seated and engrained idea that German Irises want water, because the wild Flag Iris of our country streams and ditches, which is an absolutely different plant, lives in mud and water. The German Iris, on the contrary, delights in a dry soil, revels in a good baking sun, and never seems to find the sun too hot, unless it be in such exceptional times of

prolonged drought when all vegetation faints ; but even then the German Iris bears it better than most plants. Watering German Irises is the surest way to kill them ; planting them in the shade is the best recipe for getting little or no bloom.

It is not generally known that by far the best time to divide clumps of German Iris and replant is in July, immediately after the blooming is over and before the new root growth has begun. At this time you may treat them apparently most unmercifully, and they never resent it. whereas, if the roots be injured (as they must be in replanting) in the autumn, they often rot back to the rhizome, and a whole year, and possibly the plant itself, is lost.

(2 and 3) The other two commonest garden Irises, the Spanish Iris, fig. 177, and the English Iris, fig. 178, are bulbous, and not like the German, rhizomatous. Both of them rejoice in the sunshine, but the Spanish loves a dry soil, and the English a moist one, and therefore where one thrives the other generally fails unless special care be bestowed upon it. Sir Michael Foster gives the following excellent advice : " If he whose garden is adapted to the English Iris wishes to grow the Spanish one, let him take the bulbs up yearly, planting them somewhat late, and choosing a sunny, dry spot. . . .

He, on the other hand, who can grow the Spanish easily, but has to fight for the English, should choose for it the dampest, unshaded situation available . . . and supply moisture artificially (if lacking) while the plants are growing and blooming."



FIG. 178.

## BOOKS REVIEWED.\*

"How the Garden Grew." By Maud Maryon. (Longmans, Green, & Co., London and New York.) 5s.

Not a severely horticultural work, though much, very much, may be learned from it by those for whom it is intended—amateur would-be gardeners conscious of complete ignorance. It recounts the efforts of the young lady at the Vicarage to make something both beautiful to look upon and useful to gather from out of three most unpromising or insufficient elements—(i) an old neglected weed-ridden flower garden; (ii) a veritable antique in the form of a factotum sexton-gardener, who has outlived many previous occupants of the parsonage-house; and (iii) a single £5 note a year! The difficulties encountered—the alternations of confident hope and absolute despair—the excuses and the makeshifts are all most humorously told, and "his Reverence" and "Old Griggs" are so cleverly depicted that one can literally hear the one chaffing and the other grumbling at the novice and her ways. An hour or two may be spent most pleasantly, this little book in hand, by all, and very profitably by any similar "ignoramus" similarly situated to its authoress.

"The Century Book of Gardening." E. T. Cook, Editor. (Geo. Newnes & Co., Southampton Street, London.) 18s.

Without exception the most beautiful book of garden literature and garden illustrations we have ever seen. The paper and printing leave nothing to be desired, and the type used is exquisitely clear. It is in every way a marvel of production, and it is difficult to understand how such a magnificent work can have been produced at the cost price. We are confident in recommending every Fellow of the Society, who really cares for gardens and plants, to secure a copy. No one should be without it. All the principal subjects of gardening are dealt with in masterly manner—hardy flowers, greenhouse and foliage plants, the fruit garden, vegetables, ferns, roses, grapes, shrubs and flowering trees, terraces, lawns, pergolas—in fact, we have noted hardly any omissions; and the illustrations—about 800—are beyond all praise, a very large proportion of them being regular pictures of the highest art value, and being, almost in every case, reproductions from photographs, they are all the more delightful to the true lover of nature and gardens.

"The Coccidæ, or Scale Insects, and Mealy Bugs of the British Isles." By Robert Newstead, F.E.S., F.R.H.S. (Ray Society, London.)

Mr. Newstead's complete work on these destructive insects will shortly be published by the Council of the Ray Society in monographic form, comprising two 8vo volumes, to be illustrated by nearly 200 coloured and plain plates, which have been designed to meet the wants of both the scientist and the horticulturist. The first volume will deal with the

\* Authors and Publishers wishing Books reviewed are particularly requested to state the price of each work.

most approved methods of prevention and remedies, and there will also be chapters dealing with distribution; acclimatisation; courtship; natural enemies of the Coccidæ, including some valuable records from post-mortem examinations of birds; collecting and preserving Coccidæ; bibliography and glossary of terms, besides the chapters descriptive of the insects themselves. Such an important work as this should find a place in the reference library of the "Bothy," and all educational institutions.

The volumes are issued as the return for annual subscriptions, and those wishing to possess them should become subscribers to the Ray Society for the years of issue, viz., 1901 and 1902. The Annual Subscription of One Guinea is payable to the Secretary, the Rev. Prof. Thos. Wiltshire, D.Sc., 25 Granville Park, Lewisham, London, S.E., to whom all communications should be addressed. The opportunity of acquiring these invaluable volumes should not be lost or forgotten by horticulturists and naturalists.

"Alpine Plants." By W. A. Clark. (Upcott Gill, London.)

An invaluable handbook to the cultivation of the rarer and more difficult Alpines. It is a book of only one hundred pages, but no space is wasted and no words needlessly used. The plants are mentioned in alphabetical order, and the special likes, dislikes, and general requirements of each are stated with really minute cultural directions, upon which no doubt the hope of success chiefly depends. With such a guide it ought to be more difficult to lose Alpines than, as so many of us have hitherto found, to keep them alive.

"The Gardener's Assistant." By Robert Thompson. New edition, by William Watson, F.R.H.S. (Gresham Publishing Company, London.) In 4 vols., 8s. each.

Originally written by the late Mr. Thompson, the Superintendent of the Royal Horticultural Society's Gardens at Chiswick, and regarded by all practical men as being the best gardener's assistant published, we have for many years been hoping for a new edition, under the charge of someone as capable as the original author, and at last we have got it. That Mr. Watson, of Kew, is the editor is at once sufficient guarantee and assurance that every item of the work will be revised and written up to the very latest sources of horticultural knowledge and skill. Volumes I. and II. are before us, and it is not too much to say that they are as near to perfection as such a work possibly can be, and will be found equally valuable and helpful to the beginner and to the advanced gardener alike. They treat of the structure and growth of plants, their methods of culture and propagation, their flowering and fruiting, their insect pests and fungoid diseases, soils, manures, garden tools, and glass houses, laying out of gardens, trees and shrubs, hardy plants, aquatics, Orchids, &c., &c. There appears to be no sort of information or subject the gardener can want but he may find it herein. The volumes are profusely illustrated and the woodcuts are exceptionally good. Coloured plates of flowers we never care for; they almost always either do more, or less, than justice to what they profess to represent. We congratulate the horticultural world on this excellent reissue of one of our best old standard works.

"Calendar of Flowering Trees and Shrubs." By Henry Hoare. (Richard Flint & Co., Fleet Street, London.)

A beautifully printed book with a few well executed coloured plates. Under the heading of the twelve months of the year a list is given of trees and shrubs in bloom in each, and then a description of them follows arranged in alphabetical order. The great difficulty in preparing such a book must have been to decide what *not* to include, and if the author had spread his net a trifle wider we should not have complained; but perhaps it is better to include too little than to include too much, and thereby disappoint those who expect a flowering tree or shrub to be of necessity a very showy one. It is worthy of a place in the library or on the drawing-room table of any English country house.

"(Guide to Garden Plants." By John Weathers. (Longmans, Green & Co., London and New York.) 21s.

It is impossible to do justice to a book of 1,000 pages in the few lines permitted for review, but let us say at once that this will be a useful book for amateurs wanting a dictionary of hardy out-door garden plants. That the book owes much to Mr. Nicholson's invaluable "Dictionary of Gardening" is self-evident, but so must any book of this description if it is to be worth having. But whilst on the one hand Mr. Nicholson's book covers much more ground than the present, and is therefore far more complete, Mr. Weathers's contains more, or at least more frequently repeated, cultural notes; and though it would be absurd to suppose that so lengthy a book could be faultless, still we can recommend it for just the purpose for which it is intended, viz., for amateurs wanting to grow hardy out-door plants, and absolutely ignorant of what to grow or how to grow them. There is one thing we should strongly recommend in any future edition, and that is making it into two volumes, as in its present form it is somewhat unwieldy for a book intended, as it is, for constant every-day reference. Or perhaps a better emendation still would be to omit almost all the first 130 pages and all of the sections dealing with Fruit and Vegetables, and to make it a book of simply Hardy (and a few Half-hardy) flowering plants. The sections on Fruit and Vegetables would, we think, hardly be missed, for scant justice is done to these two important departments of a garden—how scant may be judged by comparing the 900 pages devoted to Flowers with the 74 allowed for Fruit, and the 66 considered enough for the whole Vegetable garden. The element of true proportion seems to have been lacking here.

"Flora of Bournemouth." By Edward F. Linton, M.A. (H. G. Commin, Bournemouth.)

An admirable handbook to the flowers and ferns of the district included in a twelve-mile radius of Bournemouth, giving many different localities in which each plant is to be found, together with chapters on the climate, geology, &c., of the district. Our great fear for such books is lest they should fall into the hands of some who, learning from them where rare plants are to be found, should forthwith proceed to exterminate them in their ambition to annex all that is rarest of our native flora. We ourselves know of the habitat of one exceedingly rare British plant, but we reli-

giously refuse to tell our dearest friend of it, preferring that, concealed from the plant destroyer, its discovery may some day reward the patient research of some plant lover who will respect its rarity and its seclusion like ourselves.

"Quick Fruit Culture." By John Simpson. (Pawson & Co., High Street, Sheffield.)

An excellent condemnation of the severe method of pruning fruit trees which prevailed almost universally until a comparatively few years ago, and which we fear is still practised by the majority of those who call themselves gardeners, though it has long since been discarded by the masters of the craft. It is a thousand pities that such a useful little book should be so terribly disfigured by an antique list of "Best Varieties of Pears," on page 40, certainly not half of which would any good fruit grower include in his best dozen varieties. The list of Plums, too, on p. 51, certainly needs revision, the best cooking Plum ever raised, Rivers's "Early Prolific," being not so much as hinted at. "Lord Napier," too, is not mentioned amongst Nectarines! The list of Strawberries also needs revision. We should like to see a new edition with these matters altered, and then we could altogether commend the work.



## REPORT ON CELERY AND CELERIAC AT CHISWICK, 1900.

THIRTEEN stocks of Celery were received for trial, all of which were sown on March 12 in gentle heat: the seedlings were grown on without a check, and when large enough were planted out in well manured trenches, and frequently watered during dry weather. The whole collection made excellent growth, almost entirely free from the leaf-boring maggot, and without any plants running to seed. The pink or red varieties possessed the best and most nutty flavour, and are the most valuable for general purposes. The Fruit and Vegetable Committee examined the collection on December 11.

**A.M.** = Award of Merit.

1. Bibby's Defiance White, **A.M.** December 18, 1900 (Watkins & Simpson).—Plants dwarf and thick; hearts large and solid, crisp and of good flavour; foliage large and not deeply serrated.

2. Champion Solid White, **A.M.** December 18, 1900 (Barr). Plants dwarf and very compact; hearts large and firm, crisp, and sweet in flavour; foliage of medium size and moderately serrated.

3. Clayworth Prize Pink (Watkins & Simpson).—Plants large; pale pink leaf stalks; hearts large, thick, white, and of very good flavour. This variety is largely grown in the north of England. Foliage pointed and deeply serrated.

4. Covent Garden Red, **A.M.** December 18, 1900 (Watkins & Simpson). Plants large and thick; hearts solid, crisp, with a fine nutty flavour; foliage broad and very distinct.

5. Early Rose, **A.M.** December 18, 1900 (Messrs. J. Veitch).—Plants of moderate size, outer leaves pale pink, the large thick hearts being pure white; flavour nutty, crisp, and excellent; foliage very serrated.

6. Dwarf Gem (Watkins & Simpson).—Plants very short and thick; hearts rather small, pure white, and of fairly good flavour; foliage broad and much serrated. This variety is too small to find great favour.

7. Ivery's Pink, **A.M.** December 18, 1900 (Messrs. J. Veitch).—Plants of moderate size and thick, the inside of the leaf stalks deep red; hearts large, solid, crisp, and possessing a fine nutty flavour; foliage broad and not deeply serrated. This variety is synonymous with Ivery's Nonsuch Pink.

8. New Solid Pink (Barr).—Plants dwarf and thick; hearts large, solid, crisp, and of very good flavour; foliage deeply serrated.

9. Sandringham (Messrs. J. Veitch).—Plants dwarf and thick; hearts solid, pale pink, and of good flavour; foliage deeply serrated. This is quite distinct from Sandringham White.

10. Standard Bearer, **A.M.** December 18, 1900 (Watkins & Simpson). Plants tall and thick, with very marked prominent red ribs on the leaf-stalks; hearts large, solid, very crisp, with an excellent nutty flavour;

foliage broad and deeply serrated. This appears to be a larger and improved form of the well known Major Clarke's Solid Red.

11. *Superb White* (Messrs. J. Veitch).—Plants tall and thick; hearts firm, crisp, and of good flavour; foliage large and deeply serrated.

12. *White Plume* (Messrs. J. Veitch).—Plants dwarf, the outside leaves green, the inner leaves heavily marked with white; hearts below the medium size, of poor flavour, and of little value.

13. *Wright's Giant White* (Messrs. J. Veitch). Very similar to No. 2, except that the foliage is broader.

#### CELERIAC.

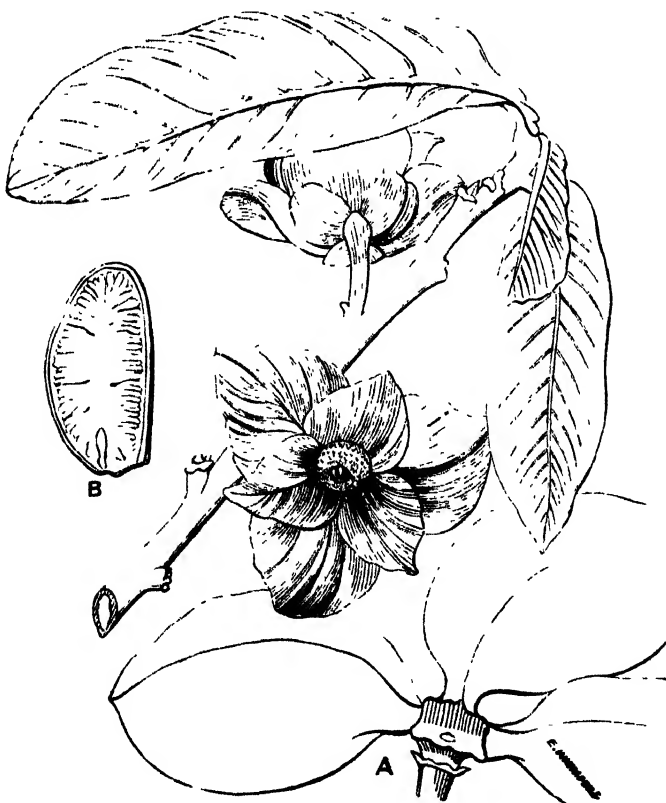
1. *Concord* (Messrs. J. Veitch).—Bulb large and moderately smooth; foliage large and spreading; one of the best.

2. *Improved Early* (Messrs. J. Veitch).—Bulb small; foliage heavily marked with white; too small to be of any value.

3. *Large Smooth* (Barr).—Bulbs large and rough, nearly covered with roots; foliage large and spreading.

4. *Parisian* (Messrs. J. Veitch).—Very similar to No. 3.

5. *Prague* (Messrs. J. Veitch).—Bulbs large and smooth; foliage large and spreading; a very good variety.



## REPORT ON LATE POTATOS AT CHISWICK, 1900.

Forty-nine varieties of late Potatos were sent for trial, and seventeen of the older and well-proved varieties were grown side by side for comparison. The whole collection was planted on May 11, in rows three feet apart, and fifteen inches apart in the rows, on ground that had been ridge-trenched the previous autumn. The majority of the varieties grew well and produced good crops. The Fruit and Vegetable Committee examined the collection on four occasions, and they decided that the value of the trial would be greatly enhanced if the best varieties were kept until December 11, and cooked then, after having been lifted and stored about two months, which was done. The Committee further decided that all varieties sent without name, under numbers only, should be ignored. The following varieties, by reason of their heavy crops and good appearance, were selected for cooking to test their quality, viz. : —

Baden-Powell	Kate Henderson
Beehive	Kerr's A
Centenary	Kerr's B
Collier's Glory	Kruger's Master
Duchess of Buccleuch	Superb
Duchess of York	Supreme
Dumfries Model	Tommy Atkins.
Gem	Twentieth Century
General Roberts	

**F.C.C.** = First-class Certificate.

**A.M.** = Award of Merit.

1. Baden-Powell, **A.M.** September 11, 1900 (Caddick).—Roundish ; pale pink, somewhat like Beauty of Hebron, but distinct in the haulm ; eyes shallow ; heavy crop, free from disease ; haulm short. Mid-season or late.

2. Beehive (Kerr).—Round ; white ; eyes shallow ; large ; heavy crop, free from disease ; haulm tall and robust.

3. Centenary, **A.M.** September 11, 1900 (Sutton).—Round ; white ; eyes full ; large ; good crop, slightly diseased ; haulm tall and robust.

4. Charles Fidler (Fidler).—Round ; white ; eyes shallow ; large ; heavy crop, free from disease ; haulm tall and robust.

5. Collier's Glory, **A.M.** August 16, 1900 (Compton).—Round ; white ; eyes full ; large ; very heavy crop, free from disease ; tall haulm. Mid-season.

6. Cramond Blossom (Mather).—Round ; white ; eyes shallow ; uneven in size and form ; light crop, slightly diseased ; haulm tall and robust.

7. Distinction (Brown).—Kidney ; white ; eyes shallow ; large ; light crop, slightly diseased ; haulm very tall.

8. Duchess of Buccleuch (Kerr).—Round ; white ; eyes full ; medium size ; very heavy crop, slightly diseased ; haulm very tall and strong.

9. Duchess of York (Barnes).—Round; white; eyes full; handsome; russety; heavy crop, slightly diseased; moderate haulm.

10. Dumfries Model, A.M. December 18, 1900 (Kerr).—Round; white; handsome; eyes full; medium to large; very heavy crop, free from disease; haulm tall and robust.

11. Dumfries Rival (Kerr).—Round; white; eyes shallow; rather small; heavy crop, free from disease; haulm very tall and strong.

12. Epicure (Sutton).—Round; white; rough skin; eyes deep; large; moderate crop, free from disease; haulm rather short.

13. Flourball (Sutton).—Round; red; deep eyes; medium size, much grown out; heavy crop, much diseased; haulm moderate.

14. Gem (Kerr).—Round; white; eyes deep; medium size; heavy crop, slightly diseased and grown out; haulm tall and very robust.

15. General Buller (Kerr).—Round; red; eyes deep; medium to large; good crop, slightly diseased; haulm tall and robust.

16. General French (Kerr).—Flat round; white; eyes full; medium size; good crop, slightly diseased; haulm tall and strong.

17. General White (Kerr).—Round; white; eyes shallow; small and grown out; very heavy crop, slightly diseased; haulm tall and robust.

18. Ideal (Sutton).—Flat round; eyes shallow; large, handsome; moderate crop, free from disease; haulm short.

19. Invincible (Sutton).—Round; white; eyes shallow; large; heavy crop, much diseased; haulm tall and robust.

20. Kate Henderson (A. Dickson).—Round; white; eyes rather deep; large, with russety skin; poor crop, much diseased; haulm tall and strong.

21. Kerr's A (Kerr).—Flat kidney; white; eyes full; large; moderate crop, free from disease; haulm moderate.

22. Kerr's B (Kerr).—Round; white; eyes shallow; large, handsome; heavy crop, free from disease; haulm moderate.

23. Kerr's C (Kerr).—Round; white; russety; eyes shallow; medium size; light crop, much diseased; haulm tall and robust.

24. Kruger's Master (Smith).—Round; purple; very similar to Vicar of Laleham.

25. Ladysmith (Smith).—Flat round; white; eyes full; large; heavy crop, free from disease; haulm tall and robust.

26 to 32. (Laxton).—These varieties were received under numbers only.

33. Leda (Kerr).—Variable in form, usually kidney; pinkish red; eyes shallow; large; moderate crop, slightly diseased; haulm tall and robust.

34. Leicester Prolific (Harrison).—Round; white; eyes shallow; medium size; light crop, slightly diseased; haulm moderate.

35. Lord Dundonald (Kerr).—Round; white; eyes rather deep; medium size; good crop, free from disease; haulm tall and robust.

36. Lye's Prolific (Lye).—Kidney; white; eyes full; small; light crop, much diseased; haulm tall and robust.

37. New Main Crop (Fidler).—Flat round; white; eyes full; large; light crop, free from disease; haulm tall and very robust.

38. Old Mother Hubbard (Hubbard).—Round; white; eyes shallow; small; poor crop, free from disease; haulm tall and robust.

39. Professor (Kerr).—Round; red; eyes shallow; rather small; great crop, slightly grown out, free from disease; haulm tall.

40. Purple Beauty (Lye).—Round; purple; eyes shallow; small; light crop, slightly diseased; haulm tall and robust.

41. Red Perfection (R. Veitch).—Round; pale red; eyes deep; large; good crop, free from disease; haulm moderate.

42. Reliance (Sutton).—Kidney; white; eyes shallow, medium size; large; moderate crop, free from disease; haulm moderate.

43. Superb (Kerr).—Round; white; eyes rather deep; large; heavy crop, much diseased; haulm tall and robust.

44. Supreme, **A.M.** September 11, 1900 (Sutton).—Flat round; white; eyes full; handsome, large; very heavy crop, free from disease; haulm tall and robust.

45. Tommy Atkins (Blinco).—Round; white; eyes full; medium size; light crop, free from disease; moderate haulm.

46. Triumph, **F.C.C.** September 12, 1893 (Sutton).—See Vol. xxiii. Part 2, page 172.

47. Twentieth Century (Hubbard).—Pebble-shape; white; eyes full, medium size; good crop, free from disease; haulm tall and robust.

48. Unnamed variety (Jackson).—Very similar to No. 4.

49. Windsor Castle, **F.C.C.** September 12, 1893 (Sutton).—A well known popular variety that still maintains its reputation as one of the best varieties.



## REPORT ON MISCELLANEOUS VEGETABLES.

1. Carrot 'Early Market' (Harrison).—Root of medium size, almost like 'Intermediate,' but attaining maturity quicker than that variety.

2. Chinese Cabbage ('*Brassica sinensis*,' *var.* 'Chou de Chine') (Charles, Tientsin).—Leaves half erect, oblong, shining green, with pale leaf stalks; foliage spreading, and not forming a heart as in the ordinary cabbage. Seeds sown on a warm border on April 3 produced plants ready for use on June 9. This should prove a useful vegetable, as it comes quickly into use, the large leaves being cooked as Spinach, which it somewhat resembles in flavour. To obtain a continuous supply it would be necessary to sow successionally, as the plants soon run to seed.

3. Gourds (Bonavia). A small collection of the large fruited varieties.

4. Hybrid Squash (Van Orman, U.S.A.).—This was said to be a hybrid between the Squash and Musk Melon, but there was no evidence of the cross.

5. Musk Melon (Van Orman).—Growth very similar to that of the ordinary Vegetable Marrow, bearing large oval dark-green ribbed fruit with orange-coloured flesh. It does not appear to be likely to have much value in this country.

6. New Sprouting Kale (J. Veitch).—A very hardy and productive Kale that received an Award of Merit, April 26, 1898, under the name of 'Read's Sprouting.' See Vol. xii., page lxviii.

7. Onion 'Up to Date' (Harrison).—A deep globular bulb of good shape, with a pale brown skin.

8. '*Physalis Peruviana*' (Bonavia).—This is best known as the 'Cape Gooseberry.' The plant is not very ornamental, but produces pale coloured fruits freely, which make a very good preserve, and are also considered very palatable by some for dessert.

9. Squash 'Pure Breed' (Van Orman).—Growth similar to that of the Gourd, with medium-sized oval pale-green fruit.

10. Turnip 'Exhibition, Marbled' (Harrison).—Not a success.

11. West African Spinach (Royal Gardens, Kew).—A species of *Amaranthus* of no value in this country, the small pale-green leaves being too small and sparsely produced to make the plant useful in its present form; it might, however, perhaps be improved by selection or hybridisation. The plants quickly run to seed.



## REPORT ON INSECTICIDES, APPLIANCES, &amp;c.

1. Patent Broom Fasteners (Haydon).—This is a metal band girdling the top of the broom ; it can be tightened or loosened at will by a screw. The screw should be made of harder material, as the thread strips after using a few times.

2. Sear's Patent Tree Holders (Bunyard). - These are made in the shape of a horseshoe, and are of different sizes to suit standard orchard or park trees, standard roses, &c. The bend of the holder is perforated by a screw which secures the holder firmly to a stake ; inside the bend the tree is protected with straw or similar material, and immovably fastened with wire clipping the padding round the stem.

3. Serum (Gleeson).—A fluid preparation for the destruction of Rust on Chrysanthemums, Carnations, &c. This will be tested if any Rust appears.

4. New Patent Fruit Protectors (Darnley-Smith). — These are celluloid articles in the form of an inverted cup, for the covering of the stalk end of choice Pears, &c., from the attack of birds. They proved excellent for the purpose, and did not mark the fruits.

5. Veltha (Holmes). — Another preparation for the destruction of Mildew and Rust, which will be tested if Rust appears.

6. Weltonia (Cummins).—A preparation for destroying Mildew, for which purpose it proved most efficacious.



# REPORT OF MISCELLANEOUS FLOWERING PLANTS AT CHISWICK, 1900.

**F.C.C.** = First-class Certificate.

**S.C.** = Second-class Certificate.

**A.M.** = Award of Merit.

× × × = Highly Commended.

## ALYSSUM.

1. *Maritimum* 'Little Gem' (Veitch).—Height 6 inches; compact bushy habit; free flowering; flowers white, fragrant, borne in clusters at the tips of the growths. Useful for edgings.

## ANTIRRHINUM.

2. Mixed (Forbes).—Plants of bushy habit and very floriferous; colours various.

## BRACHYCOMBE.

3. *Iberidifolia* (Veitch). The Swan River Daisy.—Height 1 foot; spreading habit, with deep-green narrow leaves, and an abundance of small *Cineraria*-like blue-and-white flowers. Very showy.

## CALADIUMS.

4. *Alice Van Geert* (McLeod).—Leaves 20 inches long, 12 inches broad; cream-white ground freely marked with white, occasionally touched with pink and bordered with green; veins and midrib brownish-crimson, which intensify with age.

5. *Argyrites*, **F.C.C.** July 31, 1884 (McLeod).—A well known decorative kind of dwarf habit, with small deep-green leaves blotched and speckled with white.

6. *B. S. Williams*, **A.M.** May 28, 1891 (McLeod).—Leaves 22 inches long, 14 inches broad; beautiful silvery-pink ground, stained with rose and edged with green; the midrib and veins are rich crimson and very prominent.

7. *Duchesse de Mortemarte* (McLeod).—Leaves 20 inches long, 11 inches broad; pale green and white, eventually passing to bright green, and freely blotched with dark green.

8. *Duchess of Fife* (McLeod, Veitch).—Leaves 20 inches long, 12 inches broad; lovely cream-white ground marked and edged with green; veins and midrib very prominent, and in colour rosy crimson. Plant of dwarf, compact habit.

9. *Emile Verdier* (McLeod).—Leaves 18 inches long, 8 inches broad, tapering to a sharp point; white ground flushed with rose, veined and bordered with green.

10. *Gaston Chandon* (McLeod).—Leaves 23 inches long, 12 inches broad; creamy white shading to delicate green.

11. *Gerard Dow*, **F.C.C.** July 31, 1884 (McLeod).—Leaves rather flimsy, 2 feet long, 18 inches broad; delicate pinkish-white ground blotched and margined with green; midrib and veins deep red.

12. James H. Laing (McLeod).—Leaves 22 inches long, 14 inches wide, tapering to a sharp point; green ground suffused with rose and margined with green; midrib and veins rosy red.

18. John Laing (McLeod).—Leaves 18 inches long, 12 inches wide. The central portion of the leaf is rosy-crimson, and the deep irregular border greenish-white.

14. L'Insolent (McLeod).—Leaves 16 inches long, 10 inches broad; pale green ground touched with rose-pink; veins and midrib crimson.

15. Leonard Bause (McLeod).—Leaves 18 inches long, 10 inches broad; lovely cream-white ground stained with crimson on the upper half; with age the cream colour disappears and is succeeded by bright green. Dwarf habit.

16. Leopold Robert (McLeod).—Leaves 16 inches long, 10 inches broad, tapering to a rather narrow point; green ground freely spotted all over with white and margined with green; the upper portion is suffused with crimson; veins also crimson.

17. Lord Derby, **A.M.** May 21, 1895 (McLeod, Veitch).—Leaves 18 inches long, 10 inches broad; rose-pink ground with a rich suffusion of bright rose on the upper part; emerald-green ribs and veinings, with a narrow margin of paler green.

18. Lymington (McLeod).—Leaves 2 feet long, 15 inches broad; rich green, profusely netted and speckled with white and evenly edged with green.

19. Madame d'Halloy (McLeod).—Leaves 18 inches long, 11 inches broad; delicate blush white touched with rose.

20. Madame Girault (McLeod).—Leaves 20 inches long, 12 inches broad; greenish white ground netted and margined with green, and heavily suffused with crimson in the centre and upper portion of leaf. Similar to No. 16.

21. Madame Heine, **S.C.** July 31, 1894 (McLeod).—Leaves 20 inches long, 12 inches broad; greenish white marked and edged with green; the midribs and veins are crimson.

22. Madame J. R. Box (McLeod).—Leaves 22 inches long, 12 inches broad; rich rose, shaded and irregularly edged with green; midrib and veins crimson.

23. Madame Mitjana, **A.M.** July 11, 1899 (McLeod).—Leaves 20 inches long, 14 inches broad; bright red shaded with bronze. The midrib and veins are rich crimson. Very attractive.

24. Marquis F. d'Albertus (McLeod).—Leaves 24 inches long, 16 inches broad, tapering to a sharp point; bright green shading to cream white towards the centre, irregularly blotched with rose pink and occasionally striped with pale rose. Vigorous and showy.

25. Mrs. Laing (McLeod).—Leaves 23 inches long, 15 inches broad, of excellent shape; white ground suffused and marked with green and distinctly edged with bright green; the centre of the leaf is touched with rose, and the rosy-crimson veins and midrib are very conspicuous.

26. Orphée (McLeod).—Large bronzy-green leaves mottled with white; midrib and veins carmine.

27. Raoul Pugno (McLeod).—Similar to No. 30, but the midrib and veins are not quite so showy.

28. *Reine de Danemark* (McLeod).—Leaves 18 inches long, 10 inches broad; mottled green and white and margined with green. The ribs and veins are crimson, and there is a suffusion of crimson on the upper half of the leaf.

29. *Silver Cloud*, **A.M.** May 19, 1896 (Veitch).—Leaves 20 inches long, 12 inches broad; delicate silvery-white ground speckled and suffused with green and rose and faintly edged with pea green.

30. *Sir Henry Irving* (McLeod, Veitch).—Leaves 14 inches long, 10 inches broad; delicate rose or cream-white ground with a deep irregular margin of dark green speckled with yellowish white; midribs and veins rosy crimson.

31. *Sir William Broadbent* (McLeod).—Leaves 17 inches long, 10 inches broad; bronzy-green ground irregularly spotted with white and suffused with pink near the crimson midrib.

32. *Souvenir de Paro*, **F.C.C.** May 3, 1892 (McLeod).—Leaves 18 inches long, 9 inches broad; rose shading to deep green.

33. *Triomphe de Comte*, **A.M.** July 24, 1894 (McLeod).—Leaves 16 inches long, 10 inches broad; bright red in the centre, pink towards edges, netted with green; carmine midrib and green margins.

#### CALANDRINIA.

34. *Grandiflora* (Veitch).—Long, fleshy, deep-green leaves with a prominent midrib and shaded with purple on the under sides; flowers borne on spikes 15 inches high with moderate freedom; colour rosy mauve.

35. *Umbellata* (Veitch).—Compact bushy habit; moderately free flowering; flowers rich purple borne on slender stems. Excellent for edgings and useful for the rock garden.

#### CANDYTUFT.

36. New hybrid rose flowered dwarf (Veitch).—Stock not fixed.

#### CELOSIA.

37. *Pyramidalis* (Forbes).—An excellent dwarf strain with variously coloured plumes.

#### CENTAUREA.

38. *Americana alba*, **A.M.** August 15, 1899 (Veitch).—Plant of compact bushy habit; flowers large cream white with deeply divided ray florets. Sweet scented.

#### CHRYSANTHEMUMS.

39. *Autumn Glory* (Jap.) (Godfrey).—Height 5 feet; vigorous habit; shy flowering; flowers large with long quilled flesh-pink florets touched with pale salmon.

40. *Captain Bellamy* (Jap.) (Godfrey).—Height 3 feet 6 inches; sturdy habit; moderately free flowering; flowers bright yellow.

41. *Charm* (Dec.) (Godfrey).—Height 4 feet; rather weak habit; free flowering; flowers with narrow twisted lemon-yellow florets.

42. *Christmas Favourite* (Jap.) (Godfrey).—Height 7 feet; vigorous habit; shy flowering; flowers white.

43. Christmas Rose (Jap. Inc.) (Godfrey).—Height 3 feet; sturdy habit; moderately free flowering; flowers pale rose.

44. Crimson Queen (Dec.) (Godfrey).—Height 2 feet 6 inches; bushy habit; free flowering; flowers brownish crimson with a yellowish reverse.

45. Eldorado (Jap.) (Godfrey).—Height 4 feet; sturdy habit; free flowering; flowers deep golden yellow.

46. Emily Grunerwald (Ref.) (Godfrey).—Height 6 feet; diffuse habit; free flowering; flowers canary yellow.

47. Ettie Mitchell (Dec.) (Godfrey).—Height 3 feet; exceptionally free flowering; flowers deep golden yellow touched with bronze.

48. Gladys Roults (Jap.) (Godfrey).—Height 3 feet 6 inches; very free flowering; flowers with long, narrow, pure white petals.

49. Jules Fournier (Dec.) (Godfrey).—Height 8 feet; bushy habit; very free flowering; flowers pale rose passing to a lighter shade.

50. Madame Philippe Rivoire (Jap.), **A.M.** October 26, 1897 (Godfrey). Height 4 feet 6 inches; vigorous habit; free flowering; flowers large with long broad cream-white petals.

51. Ma Perfection (Inc.) (Godfrey).—Height 3 feet; shy flowering; flowers pure white.

52. Master H. Tucker (Jap.) (Godfrey).—Height 4 feet; sturdy habit; free flowering; flowers large, dull crimson with a bronzy reverse.

53. Mignonette (Dec.), **A.M.** November 10, 1896 (Godfrey).—Height 4 feet 6 inches; diffuse habit; very free flowering; flowers small with narrow thread-like lemon-yellow florets.

54. Mrs. Caterer (Jap. Anem.) (Godfrey).—Height 4 feet; sturdy habit; exceptionally free flowering; flowers large, pure white.

55. Mrs. E. Vere Freeman (Jap.) (Godfrey).—Height 3 feet; vigorous bushy habit; very free flowering; flowers deep crimson with a pale golden reverse.

56. Mrs. M. (Godfrey (Ref.) (Godfrey).—Height 5 feet 6 inches; vigorous habit; moderately free flowering; flowers white.

57. Mrs. Maling Grant (Jap.) (Godfrey).—Height 4 feet; sturdy habit; moderately free flowering; flowers orange yellow suffused with gold.

58. Plume d'Or (Dec.) (Godfrey).—Height 3 feet 6 inches; sturdy habit; free flowering; flowers with narrow rich yellow petals.

59. R. Hooper Pearson (Jap.) (Godfrey). **A.M.** October 24, 1899.—Height 5 feet 6 inches; sturdy habit; flowers large, deep golden yellow.

60. Winter White (Jap.) (Godfrey).—Height 4 feet 6 inches; flowers with white quilled florets.

#### CLITORIA.

61. Mariana (Pritchard).—This pretty Butterfly Pea was introduced from the United States about the middle of the seventeenth century. Its pale blue flowers are borne freely during August and September.

#### DIANTHUS.

62. Chinensis Heddewegii Salmon Queen, fl. pl. (Veitch).—Stock not fixed.

# HELIANTHUS.

63. *Cucumerifolius compactus* (Roemer).—Plant 2 feet high, of bushy spreading habit, with serrated rough deep-green leaves; very free flowering; flowers small deep yellow with a prominent dark centre.

# LARKSPUR.

64. *Empress Carmine* (Veitch).—Height 2 feet; sturdy habit; free flowering; flowers bright carmine, showy and enduring.

65. *Empress Fiery Scarlet* (Veitch).—Height 2 feet; branching habit; free flowering; flowers rich scarlet shading to rose-pink with age.

# LAVATERA.

66. *Trimestris Rose* (Veitch).—Height 2 feet; branching habit; free flowering; flowers large, 2½ inches across, rich rose with paler shadings and marked with rosy purple at the base.

# MARIGOLD.

67. *French gold-striped* (Dobbie).—Plants of bushy habit; very free flowering; flowers large, dull brown striped with gold.

# MIMULUS.

68. *Mixed* (Forbes).—An ordinary selection.

# MONTBRETIA.

69. *Germanica* (Pfitzer).—The plants made little growth and flowered sparingly.

# PAPAVER.

70. *Mixed seedlings* (Pritchard).—A fairly good selection.

# ZONAL PELARGONIUM.

71. *Pettigrew's Seedling* (Pettigrew).—Plant of compact bushy habit; exceptionally free flowering; flowers semi-double, borne in large trusses on stiff stems well above the foliage; colour orange-scarlet shading to light purple with age.

# PENTSTEMONS.

72. *Mixed* (Forbes).—An ordinary strain.

# PHLOX DRUMMONDII.

73. *Hortensioeflora* (J. Veitch).—Height 9 inches; compact bushy habit; very free flowering; flowers bright rose with a white eye.

74. *Hortensioeflora Deep Scarlet* (J. Veitch).—Height 10 inches; compact habit; very free flowering; flowers large, deep scarlet with a crimson eye.

75. *Hortensioeflora Scarlet*, carmine eye (J. Veitch).—Stock not fixed.

76. *Hortensioeflora Violet Purple* (J. Veitch).—Height 9 inches; compact bushy habit; free flowering; flowers deep purple flushed with violet on the reverse side.

77. *Hortensioeflora White* (J. Veitch).—Height 10 inches; compact

habit; exceptionally free flowering; flowers large, white with a pale lemon eye.

78. *Nana Chamoise Rose* (R. Veitch).—Height 6 inches; compact habit; very free flowering; flowers salmon-rose with a lighter centre, very showy.

79. *Nana compacta atropurpurea* (R. Veitch).—Height 5 inches; sturdy habit; very free flowering; flowers deep purple with a darker centre.

80. *Nana compacta oculata* (R. Veitch).—Height 5 inches; bushy habit; free flowering; flowers white with a purple centre.

81. *Nana compacta splendens* (R. Veitch).—Height 8 inches; compact bushy habit; very free flowering; flowers crimson with a prominent white eye. Very pretty in masses.

82. *Nana compacta variabilis* (R. Veitch).—Stock not fixed.

83. *Nana Defiance* (R. Veitch).—Stock not fixed.

84. *Nana Fireball* (R. Veitch). Height 6 inches; spreading habit; very free flowering; flowers bright scarlet with a deeper eye.

85. *Nana Leopoldi* (R. Veitch).—Height 6 inches; very bushy habit; moderately free flowering; flowers bright rose with a white centre.

86. *Nana Snowball* (R. Veitch).—Height 6 inches; compact sturdy habit; very free flowering; flowers large, pure white with a delicate lemon eye.

87. *Nana violacea* (R. Veitch).—Height 6 inches; bushy habit; very free flowering; flowers large, violet-purple with a crimson eye.

#### SALVIA.

88. *Splendens Silver Spot* (R. Veitch).—This differs from the type by reason of its rich green leaves being spotted with white.

#### SPRAGUEA.

89. *Umbellata* (Veitch).—Height 4 inches; compact habit; with deep green leaves and cockscomb-like pink or pale rose flowers. This dainty little plant, introduced from California upwards of forty years ago, is well adapted for the rock garden or as an edging to beds of dwarf-growing plants.

#### SWEET PEAS.

90. *Admiration* (Dean).—Height 3 feet 6 inches; flowers large, deep mauve.

91. *Brilliant* (Dean).—Height 3 feet 6 inches; medium-sized flowers with reddish standards edged with purple; wings carmine.

92. *Burpee's New Countess* (Dean).—Height 3 feet 6 inches; free flowering; flowers large, bluish mauve.

93. *Creole* (Dean).—Height 4 feet 6 inches; free flowering; flowers large and of good form; standards pink suffused and edged with blue; wings delicate blue with deeper veinings.

94. *Daybreak* (Dean).—Height 3 feet; flowers large, with undulated rose-pink standards; wings pink.

95. *Dolly Varden* (Dean).—Height 3 feet 6 inches; free flowering; flowers large, mauve edged and shaded with blue.

96. *Earliest of All* (Dean).—Standards rose pink; wings pale pink.

97. Fashion (Dean).—Height 3 feet 6 inches; standards purplish rose; wings rose touched with blue.

98. Gorgeous,  $\times \times \times$  July 23, 1900 (Dean).—Height 4 feet; very free flowering; flowers of excellent shape; standards salmon; wings carmine flushed with salmon.

99. Hon. Edith Gibbs (Aldenharn).—Height 4 feet; free flowering; flowers large; standards pink; wings flushed with pink on a white ground.

100. Juanita (Dean).—Height 3 feet; flowers blush-white flaked with blue.

101. Lord Aldenharn (Aldenharn).—Height 3 feet; free flowering; flowers large, with broad rose-pink standards; wings pink.

102. Lottie Hutchins,  $\times \times \times$  July 23, 1900 (Dean).—Height 4 feet; flowers large, cream suffused with pink.

103. Maid of Honour,  $\times \times \times$  July 23, 1900 (Dean).—Height 4 feet; flowers with broad white standards, shaded and margined with blue; wings edged blue.

104. Navy Blue,  $\times \times \times$  July 23, 1900 (Dean).—Height 3 feet 6 inches; free flowering; flowers deep blue; standards touched with purple.

105. Oriental (Dean, Dobbie).—Height 3 feet 6 inches; free flowering; flowers bright salmon-pink; wings rose touched with salmon.

106. Pink Friar (Dean).—Mixed.

107. Ramona,  $\times \times \times$  July 23, 1900 (Dean).—Height 4 feet; flowers with broad substantial standards, white marked with pink.

108. Sensation (Dean).—Height 4 feet; free flowering; flowers large, flesh pink.

109. Snapdragon (Dean).—Height 4 feet; free flowering; flowers small, snapdragon-like in shape, white suffused and tipped with pink.

110. Stella Morse,  $\times \times \times$  July 23, 1900 (Dean).—Height 4 feet; very free flowering; flowers large, cream-white, delicately suffused with pink.

111. Wawona (Dean).—Height 4 feet; flowers with broad standards, heavily marked with purple on a white ground.

#### CUPID SWEET PEAS.

112. Alice Eckford (Dean).—Free flowering; flowers large, white; standards rose-pink tipped with green.

113. Beauty (Dean).—Exceptionally free flowering; flowers large and handsome; standards pink; wings white flushed with pink.

114. Boreatton (Dean).—Moderately free flowering; flowers deep purple.

115. Burpee's Bush (Dean).—Height 1 foot; moderately free flowering; flowers slaty-mauve on a light ground.

116. Countess of Radnor (Dean).—Shy flowering; flowers pale mauve.

117. Invincible Red (Laxton).—Shy flowering; flowers red.

118. Monarch Bush (Dean).—Height 1 foot; standards purple; wings bluish violet.

119. Pink Cupid (Dean).—Free flowering; flowers pink.

120. Purple Cupid (Laxton).—Mixed.

#### VISCARIA.

121. *Cardinalis fulgens* (Veitch).—Height 14 inches; slender habit; very free flowering; flowers shading to purple with age.

## REPORT ON CACTUS DAHLIAS, 1900.

A COLLECTION of 146 stocks of Cactus and Decorative Cactus Dahlias was planted in June in good, well drained ground, the distance between the plants being about 4 feet each way, the object being to discover the varieties best adapted for border culture.

On account of the very hot dry weather in July, the plants made little growth until August and September; the first-named month being unusually wet, vigorous growth ensued which seemed likely to be at the expense of the flower, but from the end of September to the early part of November many of the plants were literally smothered with blossoms, especially the varieties named 'Exquisite,' 'King of Siam,' 'Orange Glare of the Garden,' 'Alfred Vasey,' 'Mrs. John Goddard,' 'Sunshine,' 'J. E. Frewer,' 'Night,' 'William Cuthbertson,' 'Britannia,' 'Dr. Jameson,' 'Countess of Lonsdale,' and 'Salisbury White.'

The Floral Committee examined the collection upon two occasions and Highly Commended thirty varieties.

**F.C.** = First-class Certificate.

**A.M.** = Award of Merit.

**B.C.** = Botanical Certificate.

× × × = Highly Commended.

## CACTUS VARIETIES.

## I.—FLOWERS WHITE.

1. *Arachne*, **A.M.** September 21, 1897 (Veitch).—Height 4 feet; bushy habit; moderately free flowering; flowers white or cream white, margined and suffused with orange-scarlet, borne well above the foliage.

2. *Keynes White*, **A.M.** September 21, 1897, × × × October 5, 1900 (Veitch, Forbes).—Height 4 feet; bushy habit; free flowering; flowers cream-white passing to pure white with a greenish-yellow centre, borne on stout stems well above the foliage.

3. *Mrs. A. Peart*, **A.M.** September 26, 1898 (Forbes, Cannell).—Height 3 feet 6 inches; bushy habit; shy flowering; flowers with pointed petals, cream-white with a sulphur-yellow centre, borne on rather slender stems just about level with the foliage.

## II.—FLOWERS YELLOW.

4. *Blanche Keith* (Mortimer, Dobbie, Cannell).—Height 4 feet; spreading slender habit; moderately free flowering; flowers large, with broad sharply-pointed canary-yellow petals, borne on short slender stems, and partly hidden by the foliage.

5. *Countess of Gosford* (Mortimer, Forbes, Cannell).—Height 4 feet; bushy habit; shy flowering; flowers yellow shaded with orange, borne on short stems and almost hidden by the foliage.

6. *Daffodil*, **A.M.** August 10, 1897 (Cannell, Dobbie).—Height 4 feet; compact bushy habit; shy flowering; flowers of medium size with narrow

pointed primrose-yellow petals, borne on rather short stems and almost hidden by rich green foliage.

7. Eileen Palliser (Forbes).—Height 4 feet 6 inches; bushy habit; moderately free flowering; flowers large, with rich creamy-yellow petals, borne on slender stems and hanging amongst the foliage.

8. Ethel (Dobbie).—Height 4 feet; sturdy habit; moderately free

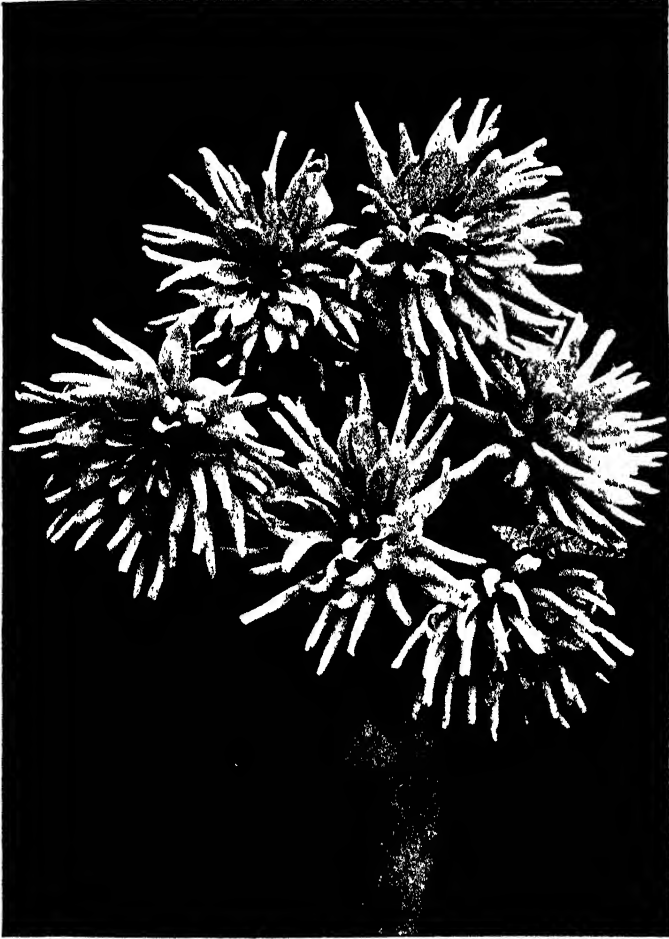


FIG. 179. —CACTUS DAHLIA. (*The Garden*.)

flowering; flowers with sharply pointed petals, canary-yellow, passing to a deeper shade, borne on long stems well above the foliage.

9. George Marlow (Cannell). - Height 4 feet; vigorous spreading habit; free flowering; flowers canary-yellow touched with rose, borne on short stems just level with the foliage.

10. Harmony, **A.M.** September 25, 1894 (Dobbie, Forbes, Mortimer, Cannell).—Height 3 feet 6 inches; bushy habit; shy flowering; flowers with long pointed petals, bronzy yellow, borne on stiff stems well above the foliage.

11. J. F. Hudson (Cheal).—Height 3 feet 6 inches; bushy habit; moderately free flowering; flowers with narrow incurving petals, the basal portion yellow heavily stained with rosy carmine towards the tips, borne on slender stems and partly hidden by the foliage.

12. John H. Roach (Cannell).—Height 4 feet; erect, sturdy habit; very free flowering; flowers very large, borne on strong stems well above the foliage.

13. Lady Henry Grosvenor (Cannell, Forbes).—Height 4 feet 6 inches; vigorous branching habit; shy flowering; flowers rich yellow touched with orange or buff, borne on short slender stems and partly hidden by the foliage.

14. Lady Penzance, **A.M.** August 29, 1893 (Cannell).—Height 5 feet; bushy habit; free flowering; flowers with narrow petals, rich canary-yellow, borne on short slender stems and partly hidden by the foliage.

15. Mabel Keith (Forbes, Dobbie, Cannell).—Height 4 feet; very bushy habit; moderately free flowering; flowers deep yellow, borne on stiff stems just above the foliage.

16. May Pictor (Cannell).—Height 4 feet 6 inches; vigorous branching habit; moderately free flowering; flowers rich canary-yellow, borne on short slender stems just about level with the foliage.

17. Mrs. Barnes (Mortimer, Dobbie, Cannell).—Height 4 feet; vigorous habit; rather shy flowering; flowers with long twisted pointed petals, primrose-yellow flushed with pink, borne on rather slender stems just above the foliage.

18. Mrs. S. Dickins (Cheal).—Height 4 feet; sturdy habit; moderately free flowering; flowers rich canary-yellow, borne on rather short stems and partly hidden by the foliage.

19. Mrs. Wyllie (Cannell).—Height 3 feet 6 inches; sturdy habit; shy flowering; flowers bronzy yellow, borne on short stems and partly hidden by the foliage.

20. Oaklands,  $\times \times \times$  October 5, 1900 (Cannell).—Height 4 feet; vigorous habit; very free flowering; flowers large bright yellow, borne on stiff stems well above the foliage.

21. Yellow Juarezzi (Forbes).—A beautiful yellow-flowered form of the well known Juarèzi.

### III. —FLOWERS PINK, ROSE, ROSE-PINK AND MAUVE.

22. Beatrice, **A.M.** August 27, 1895 (Mortimer, Dobbie).—Height 5 feet; vigorous habit; moderately free flowering; flowers large, light rose shading to pale purple and silvery pink towards the tips, borne on very long stiff stems well above the foliage.

23. Brema,  $\times \times \times$  October 5, 1900 (Dobbie).—Height 3 feet 6 inches; compact sturdy habit; free flowering; flowers large, rose-pink with a blush coloured centre, borne on long stiff stems well above the foliage.

24. Bridesmaid (Cannell, Dobbie).—Height 4 feet; erect sturdy habit; free flowering; flowers large, delicate rose, shading to cream-white in the centre, borne on rather short stems just about even with the foliage.

25. Delicata, **A.M.** August 29, 1891 (Cannell, Forbes).—Height 4 feet;

vigorous habit; moderately free flowering; flowers of good shape, delicate pink or peach, basal portion of petals stained with greenish yellow, borne on rather short stems and partly hidden by the foliage.

26. Island Queen, **A.M.** September 21, 1897;  $\times \times \times$  October 5, 1900 (Forbes).—Height 4 feet; compact bushy habit; free flowering; flowers of good shape, lovely rosy lilac shaded with mauve, borne on rather slender stems well above the foliage.

27. Mrs. Alihusen (Forbes, Cannell).—Height 4 feet, erect sturdy habit; moderately free flowering; flowers delicate pink with a blush-white centre, borne on slender stems just above the foliage.

#### IV.—FLOWERS PINKISH SALMON.

28. Britannia,  $\times \times \times$  September 21, 1900 (Veitch).—Height 4 feet; bushy habit; exceptionally free flowering; flowers of good shape, delicate pinkish salmon with a faint suspicion of apricot towards the basal portion of the narrow incurving petals, borne on long stems well above the foliage.

29. Countess of Lonsdale, **A.M.** September 20, 1898;  $\times \times \times$  September 21, 1900 (Dobbie).—Height 4 feet; compact bushy habit; very free flowering; flowers with long narrow pointed petals, orange-salmon shaded and tipped with rosy carmine, borne on long wiry stems well above the foliage.

30. Countess of Radnor, **A.M.** September 6, 1892 (Cannell).—Height 4 feet; bushy habit; very free flowering; flowers rich salmon shade, the lower portion of petals yellow, borne on rather short stems and partly hidden by the foliage.

31. Flossie, **A.M.** September 8, 1896 (Forbes).—Height 4 feet; compact bushy habit; rather shy flowering; flowers coral-pink stained with yellow at the base of the petals, borne on short stems and partly hidden by the foliage.

32. Mary Service, **A.M.** September 21, 1897;  $\times \times \times$  September 21, 1900 (Dobbie, Cannell, Mortimer).—Height 4 feet; very bushy habit; moderately free flowering; flowers of excellent shape with long narrow incurving petals, pinkish heliotrope shading to yellow at the base, borne on rather stiff stems just above the foliage.

33. Miss Irene Cannell (Cannell).—Height 4 feet; branching habit; shy flowering; flowers delicate salmon-pink shaded with orange, borne on rather short stems and partly hidden by the foliage.

34. Mrs. Wilson Noble, **A.M.** September 10, 1895 (Heal, Dobbie).—Height 4 feet; compact bushy habit; moderately free flowering; beautifully shaped flowers of a lovely pinkish salmon shade, borne on stiff stems well above the foliage.

35. Tillie,  $\times \times \times$  October 5, 1900 (Cannell, Dobbie).—Height 4 feet; bushy spreading habit; very free flowering; flowers of medium size and good shape, salmon-red heavily shaded with pale rose or mauve, borne on stiff stems well above the foliage.

#### V.—FLOWERS ROSEY CARMINE.

36. Emily French (Dobbie).—Height 4 feet; erect sturdy habit;

moderately free flowering; flowers reddish carmine, the basal portions of petals yellow, borne on stiff stems just above the foliage.

37. Robert Cannell, **A.M.** August 25, 1891 (Dobbie).—Height 4 feet; vigorous branching habit; rather shy flowering; flowers large, with pointed petals, rich carmine shading to purplish blue towards the tips, borne on very long stems well above the foliage.

#### VI.—FLOWERS PURPLE AND ROSE.

38. Austin Cannell,  $\times \times \times$  September 21, 1900 (Cannell, Dobbie).—Height 4 feet; bushy spreading habit; exceptionally free flowering; flowers rather small, with sharply pointed petals, rosy mauve shading to almost crimson towards the base of the petals, borne on long wiry stems well above the foliage.

39. Cinderella, **A.M.** September 8, 1896 (Veitch, Dobbie, Cannell).—Height 4 feet; bushy habit; moderately free flowering; flowers large, rich purple, borne on rather slender stems and partly hidden by the foliage.

40. Earl of Pembroke, **A.M.** September 25, 1891 (Mortimer, Forbes, Dobbie, Cannell).—Height 4 feet 6 inches; vigorous habit; free flowering; flowers large, rich plum purple, borne on stiff stems well above the foliage.

41. Eastern Queen (Mortimer).—Height 4 feet; compact sturdy habit; moderately free flowering; flowers large, with pointed petals, rich purple, borne on stiff stems well above the foliage.

42. Ernest (Hasse (Dobbie, Cannell).—Height 4 feet; vigorous habit; shy flowering; flowers light purple with paler shadings, borne on rather short stems just above the foliage.

43. Falka, **A.M.** September 21, 1897 (Dobbie).—Height 4 feet; bushy spreading habit; very free flowering; flowers rosy purple touched with crimson, borne on long stems well above the foliage.

44. Kingfisher (Cannell, Forbes).—Height 3 feet 6 inches; erect sturdy habit; flowers with narrow incurving petals, rosy purple shaded with carmine, borne on long wiry stems well above the foliage.

45. King of Siam,  $\times \times \times$  September 21, 1900 (Cheal).—Height 4 feet; erect sturdy habit; very free flowering; flowers of medium size, with broad, sharply pointed petals, rich purple shaded with maroon, borne on long stiff stems well above the foliage.

46. Leonora, **A.M.** August 27, 1895 (Dobbie, Cannell).—Height 4 feet; vigorous habit; moderately free flowering; flowers with long twisted petals, rich rose-pink, heavily tipped and shaded with silvery pink, borne on stiff stems well above the foliage.

47. Miss Finch, **A.M.** September 21, 1897;  $\times \times \times$  September 21, 1900 (Cannell).—Height 4 feet 6 inches; vigorous bushy habit; very free flowering; flowers of excellent shape, rich purplish rose, flushed with crimson towards the centre, borne on long stiff stems well above the foliage.

48. Mrs. B. Barker (Dobbie).—Height 4 feet; compact bushy habit; very free flowering; flowers of good outline, with long, sharply pointed petals, purple, with a lighter shade towards the tips, borne on stiff stems well above the foliage.

49. Mrs. Thronger (Forbes).—Height 3 feet 6 inches ; bushy habit ; shy flowering ; flowers with pointed petals, deep purple, borne on short stems and almost hidden by the foliage.

50. Profusion,  $\times \times \times$  September 21, 1900 (Cheal).—Height 4 feet ; erect bushy habit ; very free flowering ; flowers rather small and very showy, with narrow rosy purple petals borne on long wiry stems well above the foliage.

51. Purple King (Cheal, Dobbie, Cannell).—Height 4 feet ; vigorous habit ; shy flowering ; flowers rich purple, borne on stiff stems barely above the foliage.

#### VII.—FLOWERS TERRA COTTA.

52. Iona, **A.M.** September 8, 1896 (Dobbie).—Height 4 feet ; vigorous habit ; moderately free flowering ; flowers lovely terra cotta shading to orange, borne on long stems well above the foliage.

53. Miss A. Nightingale, **A.M.** September 10, 1895 (Mortimer).—Height 4 feet ; moderately free flowering ; flowers bright terra cotta, lower portion of petals yellow, borne on long stems well above the foliage.

54. Mrs. Gordon Sloane, **A.M.** September 8, 1896 (Cheal).—Height 4 feet 6 inches ; erect vigorous habit ; moderately free flowering ; flowers pinkish terra cotta, borne on stiff stems well above the foliage.

#### VIII. FLOWERS SCARLET.

55. Annie Turner (Dobbie).—Height 3 feet 6 inches ; bushy spreading habit ; moderately free flowering ; flowers with long pointed petals, scarlet with rosy carmine shadings, borne on rather short stems and partly hidden by the foliage.

56. Beauty of Arundel (Cannell).—Height 5 feet ; vigorous branching habit ; shy flowering ; flowers scarlet tipped with rosy purple, borne on long stems well above the foliage.

57. Bertha Mawley, **A.M.** September 6, 1892 (Cannell, Dobbie).—Height 4 feet ; erect branching habit ; moderately free flowering ; flowers bright scarlet, suffused with carmine and tipped with rosy purple, borne on rather short stems and partly hidden by the foliage.

58. Caesar (Cannell).—Height 4 feet ; vigorous spreading habit ; flowers with incurving petals, scarlet margined with crimson, borne well above the foliage.

59. E. J. Deal (Mortimer).—Height 5 feet 6 inches ; moderately free flowering ; flowers of excellent shape, with narrow pointed rich scarlet petals touched with orange, borne on very long wiry stems well above the foliage.

60. Ernest Cannell,  $\times \times \times$  September 19, 1895 (Cannell).—Height 4 feet ; compact spreading habit ; moderately free flowering ; flowers scarlet, shading to red in the centre, borne on stiff stems well above the foliage.

61. Fantasy, **A.M.** September 8, 1896 (Veitch, Dobbie, Cannell).—Height 4 feet ; slender habit ; moderately free flowering ; flowers with narrow incurving scarlet petals, the lower portion yellow, borne on rather slender stems just above the foliage.

62. F. M. Vokes (Cannell).—Height 3 feet 6 inches ; spreading habit ; moderately free flowering ; flowers scarlet, occasionally flushed with orange, borne on slender stems well above the foliage.

63. G. Dayrell Reed (Cannell).—Height 5 feet ; vigorous branching habit ; moderately free flowering ; flowers bright scarlet, borne on stiff stems well above the foliage.

64. Gloriosa, **A.M.** August 29, 1893 ;  $\times \times \times$  September 19, 1895 (Cannell, Forbes).—Height 5 feet ; vigorous habit ; free flowering ; flowers large, bright scarlet, borne on stiff stems just above the foliage.

65. Green's Victory (Veitch, Cannell).—Height 4 feet ; erect bushy habit ; free flowering ; flowers of good shape and substance, scarlet edged and suffused with crimson, borne on stiff stems well above the foliage.

66. J. E. Frewer,  $\times \times \times$  October 5, 1900 (Forbes, Dobbie).—Height 4 feet ; compact bushy habit ; exceptionally free flowering ; flowers vermilion-scarlet with pointed petals, borne on very long stems well above the foliage. Superior to No 76.

67. John Welch, **A.M.** September 25, 1894 (Cannell, Dobbie). — Height 5 feet ; vigorous habit ; moderately free flowering ; flowers large bright scarlet touched with crimson, borne on stiff stems well above the foliage.

68. Mayor Haskins (Forbes).—Height 4 feet ; bushy habit ; shy flowering ; flowers large rich scarlet, almost crimson, shading to orange, borne on short stems and partly buried by the foliage.

69. Mrs. Dickson (Cannell). —Height 4 feet 6 inches ; vigorous branching habit ; free flowering ; flowers bright rosy scarlet, borne just above the foliage.

70. Mrs. H. Cannell,  $\times \times \times$  September 19, 1895 (Cannell).—Height 4 feet ; sturdy habit ; free flowering ; flowers scarlet touched with amber, borne on slender stems well above the foliage.

71. Mrs. Portman Dalton (Forbes, Cannell). —Height 4 feet ; sturdy habit ; shy flowering ; flowers large, rosy scarlet tipped and shaded with rosy carmine, borne on short stems and partly buried by the foliage.

72. Nero (Veitch).—Height 3 feet 6 inches ; bushy compact habit ; very free flowering ; flowers with narrow pointed petals, rosy scarlet shaded with carmine towards the tips, borne on long stems well above the foliage.

73. Ophelia, **A.M.** October 13, 1896 (Dobbie).—Height 4 feet ; sturdy habit ; shy flowering ; flowers large, scarlet with magenta shadings, borne on stiff stems just about even with the foliage.

74. Professor Baldwin (Cannell).—Height 5 feet ; vigorous branching habit ; moderately free flowering ; flowers scarlet, borne just above the foliage.

75. Ruby,  $\times \times \times$  September 21, 1900 (Dobbie).—Height 4 feet ; very bushy compact habit ; exceptionally free flowering ; flowers with narrow pointed petals, ruby red, heavily shaded and tipped with carmine passing to magenta, borne on long wiry stems well above the foliage.

76. Standard Bearer,  $\times \times \times$  September 21, 1900 (Veitch, Dobbie, Cannell, Forbes). Height 4 feet ; very bushy compact habit ; very free flowering ; flowers scarlet shaded with rosy crimson, borne on stiff stems well above the foliage.

77. *Stella*,  $\times \times \times$  October 5, 1900 (Dobbie, Veitch, Forbes, Cannell).—Height 3 feet 6 inches; spreading habit; free flowering; flowers with narrow incurving scarlet petals touched with crimson, borne on rather stiff stems just above the foliage.

78. *Strathlenkrone* (Cannell).—Height 3 feet 6 inches; bushy habit; free flowering; flowers drooping, very large, with long pointed rich scarlet petals, borne on long slender stems.

79. *William Cuthbertson*,  $\times \times \times$  September 21, 1900 (Dobbie).—Height 4 feet; compact bushy habit; exceptionally free flowering; flowers of excellent shape with narrow pointed petals, scarlet tipped and suffused with carmine, borne on long stiff stems well above the foliage.

#### IX. —FLOWERS ORANGE AND ORANGE-SCARLET.

80. *Alfred Vasey*,  $\times \times \times$  September 21, 1900 (Mortimer, Dobbie).—Height 4 feet; very bushy habit; exceptionally free flowering; flowers with long narrow petals, orange-yellow suffused with pale salmon, borne well above the foliage.

81. *Aurora* (Cannell).—Height 4 feet; bushy habit; moderately free flowering; flowers small, orange shaded with pink, borne on rather slender stems, and partly buried by the foliage.

82. *Bennett Goldney* (Cannell).—Height 5 feet; vigorous branching habit; moderately free flowering; flowers rich orange-scarlet, borne on stiff stems well above the foliage.

83. *Cannell's Gem*, **A.M.** September 12, 1898 (Cannell).—Height 4 feet; compact bushy habit; very free flowering; flowers small, with pointed orange-scarlet petals, borne on stiff stems well above the foliage.

84. *Capstan* (Cannell, Dobbie).—Height 3 feet 6 inches; compact bushy habit; moderately free flowering; flowers large, of excellent form, rich orange-scarlet or apricot flushed with carmine in the centre, borne on stiff stems well above the foliage.

85. *Exquisite*,  $\times \times \times$  September 21, 1900 (Dobbie).—Height 4 feet; bushy habit; very free flowering; flowers with beautifully formed petals, pale orange with a still paler reverse, borne well above the foliage.

86. *Fusilier* (Mortimer, Dobbie, Cannell).—Height 4 feet; bushy compact habit; very free flowering; flowers of good shape, bright orange flushed with salmon-pink, borne on stiff stems just above the foliage.

87. *George Jull* (Cannell).—Height 4 feet 6 inches; vigorous habit; moderately free flowering; flowers large, bright orange-scarlet, borne on long stems well above the foliage.

88. *Green's Gem*, **A.M.** September 21, 1897 (Cannell, Veitch).—Height 4 feet; vigorous bushy habit; flowers rich orange suffused with salmon, borne well above the foliage.

89. *Magnificent*, **A.M.** September 6, 1898;  $\times \times \times$  September 21, 1900 (Dobbie).—Height 4 feet; compact rather slender habit; free flowering; flowers large, with incurving petals, pale orange delicately suffused with rosy salmon, borne on long stems well above the foliage.

90. *Maid of Kent* (Cannell).—Height 3 feet 6 inches; bushy habit; very free flowering; flowers with narrow petals, orange-yellow passing to old gold, borne on long stems well above the foliage.

91. Mrs. R. Beck (Dobbie, Cannell).—Height 4 feet; bushy habit; exceptionally free flowering; flowers with sharply pointed petals, orange shaded with salmon-red, borne on rather slender stems just about level with the foliage.

92. Mrs. F. Cannell (Cannell).—Height 4 feet 6 inches; moderately free flowering; flowers reddish orange with rose shadings, borne on stout stems well above the foliage.

93. Mrs. Findlay Campbell, **A.M.** September 6, 1898 (Cheal, Dobbie).—Height 4 feet 6 inches; sturdy habit; very free flowering; flowers of excellent shape, bright orange shaded with scarlet, borne on slender stems well above the foliage.

94. Mrs. H. Cannell,  $\times \times$  September 19, 1895 (Cannell).—Height 4 feet; vigorous habit; free flowering; flowers with rather short pointed petals, orange-yellow, borne on stiff stems just above the foliage.

95. Mrs. Kingsley Foster, **A.M.** October 13, 1896 (Cheal, Cannell, Dobbie).—Height 4 feet; vigorous habit; shy flowering; flowers large, amber-yellow with a deeper shade towards the centre, borne on stiff stems well above the foliage.

96. Mrs. Leopold Seymour, **A.M.** September 8, 1896 (Cheal).—Height 4 feet; bushy habit; moderately free flowering; flowers large, orange-scarlet shaded with rose, and partly hidden by the foliage.

97. Nil Desperandum (Cannell).—Height 4 feet 6 inches; vigorous branching habit; shy flowering; flowers very large, orange-red shaded with salmon, borne on long wiry stems well above the foliage.

98. Princess Ena (Forbes, Cannell).—Height 4 feet 6 inches; vigorous habit; very free flowering; flowers lemon-yellow margined with orange-yellow, borne on stiff stems well above the foliage.

99. Pumilus (Cannell).—Height 3 feet 6 inches; compact bushy habit; very free flowering; flowers orange suffused with scarlet, borne on rather short stems just about level with the foliage.

100. Starfish, **A.M.** September 8, 1896;  $\times \times \times$  October 5, 1900 (Veitch, Dobbie).—Height 4 feet 6 inches; vigorous habit; moderately free flowering; flowers with beautifully formed narrow bright orange-scarlet petals, borne on stiff stems just above the foliage.

#### X.--FLOWERS CRIMSON.

101. Africa (Dobbie).—Height 4 feet; sturdy habit; very free flowering; flowers rich crimson, borne on long stems well above the foliage.

102. Bushranger (Dobbie).—Height 4 feet; sturdy habit; free flowering; flowers deep crimson touched with purple, each petal striped down the centre with purple.

103. Charles Woodbridge,  $\times \times \times$  October 5, 1900 (Cannell, Dobbie, Mortimer).—Height 4 feet; sturdy habit; moderately free flowering; flowers very large with long sharply pointed petals, rich crimson heavily tipped with purple, borne on long stout stems well above the foliage.

104. Crimson King,  $\times \times \times$  September 21, 1900 (Veitch, Cannell).—Height 4 feet 6 inches; vigorous habit; free flowering; flowers rich

crimson shading to scarlet towards the tips and margins of the long petals, borne on very long stiff stems well above the foliage.

105. Cycle, **A.M.** September 8, 1896;  $\times \times \times$  October 5, 1900 (Veitch, Cannell).—Height 4 feet 6 inches; vigorous habit; beautifully shaped flowers with broad sharply pointed rosy crimson petals tipped with carmine, borne on stiff stems well above the foliage.

106. Dr. Jameson,  $\times \times \times$  September 21, 1900 (Forbes, Cannell).—Height 4 feet; bushy spreading habit; exceptionally free flowering; flowers with pointed petals, rich velvety crimson shaded with purple, borne on long stout stems well above the foliage.

107. Ensign (Forbes, Dobbie).—Height 4 feet 6 inches; erect habit; very free flowering; flowers large with pointed petals, rich crimson heavily tipped with carmine, borne on long stems well above the foliage.

108. F. C. Pawle, **A.M.** September 7, 1897 (Cheal).—Height 4 feet; bushy habit; free flowering; flowers of excellent shape; rosy crimson flushed with carmine towards the edges of the petals, and borne on stiff stems just above the foliage.

109. Harry Stredwick, **A.M.** September 8, 1896 (Cheal, Forbes, Veitch, Cannell).—Height 5 feet; vigorous habit; moderately free flowering; flowers with long petals, crimson flushed with maroon, borne on long stems well above the foliage.

110. Henry Ayres,  $\times \times \times$  October 5, 1900 (Cannell).—Height 4 feet; branching habit; very free flowering; flowers with pointed petals, rich velvety crimson tipped with purple, borne on long stems well above the foliage.

111. Indian Prince (Veitch).—Height 4 feet; vigorous bushy habit; free flowering; flowers with long narrow pointed petals, deep crimson, borne on wiry stems well above the foliage.

112. Juarezii, **B.C.** September 16, 1879;  $\times \times \times$  September 23, 1890 (Cannell, Forbes).—Height 4 feet; bushy habit; flowers of excellent shape, crimson-scarlet, borne on stiff stems just above the foliage.

112b. Midnight Sun (Veitch, Cannell).—Height 5 feet; vigorous habit; moderately free flowering; flowers large, deep crimson flushed with purple on the backs of the petals, borne on wiry stems just above the foliage.

113. Mrs. Hewitt (Forbes).—Height 4 feet 6 inches; erect habit; very free flowering; flowers large, deep velvety crimson shaded with purple, borne on long stems well above the foliage.

114. Mrs. John Goddard, **A.M.** September 21, 1897;  $\times \times \times$  September 21, 1900 (Veitch, Cheal).—Height 4 feet; very bushy habit; exceptionally free flowering; flowers of exquisite shape, rich crimson-scarlet, borne on long stems well above the foliage.

115. Mrs. Montefiore (Cheal, Dobbie).—Height 4 feet 6 inches; vigorous habit; moderately free flowering; flowers large and of good form, crimson shaded with scarlet towards the tips of the petals, borne on stiff stems well above the foliage.

116. Norfolk Hero (Veitch).—Height 3 feet 6 inches; compact bushy habit; moderately free flowering; flowers crimson-scarlet, borne on stiff stems well above the foliage.

117. Porcupine (Cannell).—Height 5 feet; vigorous branching habit;

moderately free flowering; flowers with pointed petals, rich crimson deepening to maroon towards the centre, borne on long stems well above the foliage.

118. *The Major* (Forbes).—Height 4 feet; vigorous habit; rather shy flowering; flowers crimson touched with carmine, borne on stiff stems just above the foliage.

119. *W. J. Frost* (Cannell).—Similar to No. 114.

#### XI.—FLOWERS MAROON.

120. *Ebony*, **A.M.** October 11, 1898 (Dobbie).—Similar to No. 122.

121. *Matchless*, **A.M.** September 20, 1892;  $\times \times \times$  September 19, 1895 (Cannell, Dobbie).—Height 4 feet; vigorous bushy habit; exceptionally free flowering; flowers maroon flushed with purple, borne on long stems well above the foliage.

122. *Night*, **A.M.** August 24, 1897;  $\times \times \times$  September 21, 1900 (Dobbie).—Height 4 feet 6 inches; vigorous habit; free flowering; flowers with sharply pointed petals, deep maroon, borne on long stems well above the foliage.

123. *Ranji*, **A.M.** September 20, 1898 (Dobbie).—Height 4 feet; erect bushy habit; very free flowering; flowers deep maroon, almost black, borne on long stiff stems well above the foliage.

124. *The Czar* (Cannell).—Height 4 feet; sturdy habit; free flowering; flowers with pointed petals, rich crimson maroon touched with purple, the centre maroon, borne on very long stems well above the foliage.

#### DECORATIVE CACTUS VARIETIES.

125. *Atalanta* (Forbes, Cannell).—Height 3 feet 6 inches; compact habit; moderately free flowering; flowers large, white suffused with lilac, borne on stiff stems well above the foliage.

126. *Baron Schröder*, **A.M.** August 25, 1891;  $\times \times \times$  September 19, 1895 (Forbes).—Height 5 feet; vigorous habit; very free flowering; flowers large, purple with paler shadings, borne on stiff stems well above the foliage.

127. *Constance* (Cannell).—Height 5 feet; vigorous bushy habit; very free flowering; flowers white, borne on long stiff stems well above the foliage.

128. *Domino* (Mortimer).—Height 4 feet; very bushy habit; shy flowering; flowers variable in colour but generally buff edged with orange, borne on long stems just above the foliage.

129. *Grand Duke Alexis*, **A.M.** September 26, 1896 (Forbes).—Height 4 feet; vigorous habit; very free flowering; flowers exceptionally large, pure white, occasionally touched with delicate pink, borne on stiff stems well above the foliage.

130. *Henry Patrick*, **F.C.** September 27, 1887 (Forbes).—Height 5 feet; vigorous bushy habit; very free flowering; flowers large with broad white petals, borne on very long stout stems well above the foliage. An excellent border variety.

131. *Herculus* (Veitch).—Height 3 feet 6 inches; compact bushy

habit; free flowering; flowers large, purple suffused with orange-scarlet, borne on slender stems just about level with the foliage.

132. *Mahala Sheriff* (Forbes).—Height 4 feet; vigorous bushy habit; very free flowering; flowers large, white with a greenish centre, borne on wiry stems well above the foliage.

133. *May Queen* (Veitch).—Height 4 feet: vigorous habit; very shy flowering; flowers large, pale mauve sometimes touched with purple, centre blush-white, borne on short stems and partly hidden by the foliage.

134. *Miss Jane Basham* (Dobbie).—Height 4 feet 6 inches; spreading habit; very free flowering; flowers with narrow pointed petals, orange suffused with salmon and pink.

135. *Miss Violet Morgan* (Forbes).—Height 5 feet; vigorous bushy habit; moderately free flowering; flowers yellow, suffused and margined with fawn, borne on short stems and partly buried by the foliage.

136. *Miss Webster*, **A.M.** August 25, 1896 (Forbes, Veitch).—Height 4 feet; spreading habit; moderately free flowering; flowers white, tinged with green in the centre and partly hidden by the foliage.

137. *Mrs. Francis Fell*, **A.M.** September 25, 1891 (Mortimer, Veitch).—Height 1 foot; rather slender habit; moderately free flowering; flowers large, white, with a faint suspicion of yellow and stained with mauve on the exterior of petals, borne on slender stems just about level with the foliage.

138. *Mrs. Renshaw* (Veitch).—Height 4 feet 6 inches; vigorous habit; shy flowering; flowers orange slightly touched with purple, borne on rather short stems and partly buried by the foliage.

139. *Mrs. Rolfe* (Forbes). Height 4 feet; sturdy bushy habit; shy flowering; flowers large with broad flat petals bright orange-red, borne on short stiff stems and partly hidden by the foliage.

140. *Orange Glare of the Garden*,  $\times \times \times$  October 5, 1900 (Cannell).—Height 4 feet; erect habit; exceptionally free flowering; flowers of medium size, bright orange-red, borne on stout stems well above the foliage.

141. *Picta formosissima* (Forbes).—Height 4 feet 6 inches; vigorous bushy habit; very free flowering; flowers bright orange, each petal margined with scarlet, borne on very long stiff stems well above the foliage.

142. *Salisbury White*,  $\times \times \times$  September 21, 1900 (Forbes, Dobbie, Veitch).—Height 4 feet 6 inches; sturdy habit: exceptionally free flowering; flowers white, borne on very stiff stems well above the foliage.

143. *St. Catherine*, **A.M.** August 25, 1891 (Cannell).—Height 4 feet; erect habit; free flowering; flowers large, pale orange-yellow shaded with salmon, borne on rather slender stems just above the foliage.

144. *Sunshine* (Veitch).—Height 4 feet; sturdy habit; very free flowering; flowers large, bright orange-scarlet, borne on stiff stems well above the foliage.

145. *The Queen* (Forbes).—Height 4 feet 6 inches; vigorous bushy habit; free flowering; flowers white, borne on stiff stems just about level with the foliage.

BOOKS PRESENTED TO THE LIBRARY DURING THE YEAR 1900.

Presented by A. P. Haig, Esq.

- "An Introduction to the Science of Botany," by James Lee.
- "Fifty Plates of Greenhouse Plants," Ed. 2, by Henrietta M. Moriarty.

Presented by Mrs. Holman.

- "A Complete Dictionary of Practical Gardening," by A. McDonald.
- "The Theory of Horticulture," by J. Lindley.
- "The Elements of Botany," by J. Lindley.
- "Medical and Economical Botany," by J. Lindley.
- "The Gardener's Dictionary," abridged by P. Miller.
- "The Botanic Garden," by E. Darwin.
- "Flowers of the Field," by Rev. C. A. Johns.
- "Le bon Jardinier, Almanach pour l'année 1841."

Presented by the Director, Royal Gardens, Kew.

- "Flora Capensis," vii., pt. 4.
- "Flora of Tropical Africa," v., pts. 2 and 3.
- "Hand-list of Tender Dicotyledons cultivated in the Royal Gardens, Kew, 1899."
- "Bulletin of Miscellaneous Information," Additional Series, iv.

Presented by Dr. Masters, F.R.S.

- "A Practical Introduction to the Study of Botany: Flowering Plants," by J. B. Farmer.
- "Botany for Beginners," by E. Evans.

Presented by Señor Aliño.

- "Tratado de Abonos," por B. G. Aliño.
- "Formulario-Codex de Abonos," por B. G. Aliño.
- "El Naranjo: resumen práctico de su cultivo, abonos y enfermedades," por el Dr. B. Aliño.

Presented by Mr. H. J. Hooper.

- "Les Engrais et la Fertilisation du Sol," par A. Larbaletrier.
- "Le Propriétaire devant sa Femme délaissée," par G. Ville.
- "Les Fleurs à Paris, Culture et Commerce," par P. L. de Vilmorin.

Presented by Mrs. Hogg.

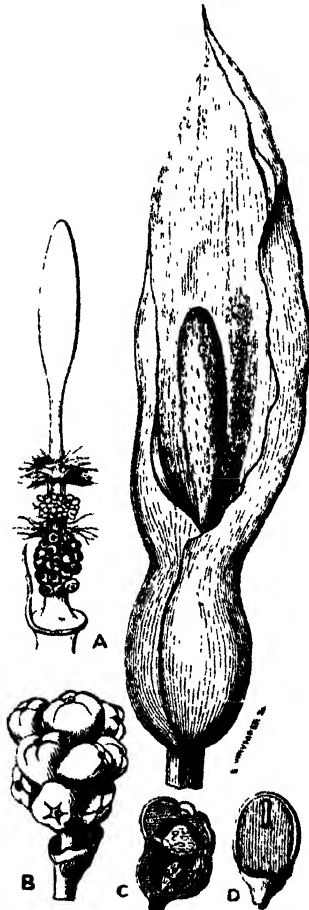
- "The Cottage Gardener," Vols. 2-25.
- "The Journal of Horticulture," Vols. 1-38.

- "Hooker's Icones Plantarum," vii., pts. 2 and 3, presented by the Bentham Trustees.
- "Veitch's Manual of the Conifera," by A. H. Kent, presented by Messrs. Jas. Veitch & Sons, Limited.
- "Report on the Working and Results of the Woburn Experimental Fruit Farm," i. and ii., presented by Spencer U. Pickering, F.R.S.
- "The Flower-Grower's Guide," Vols. 1-3, by J. Wright, V.M.H., and presented by the Author.
- "Report of Injurious Insects and Common Farm Pests during the year 1899," by Eleanor A. Omerod, and presented by the writer.

BOOKS PURCHASED DURING THE YEAR 1900.

- "Icones Bogoricensis," fasc. 3.
- "Synbola Antillana," vol. i., fasc. 3; vol. ii., fasc. 1, 2, ed. J. Urban.
- "Conspectus Florae Graecae," vol. i., fasc. 1, 2, Auctore E. de Halácsy.
- "Ueber den Habitus der Coniferen," von Dr. A. H. Burtl.
- "Flora Pyrenaea," vol. ii., by P. Buhani, ed. O. Penzig.
- "A Handbook to the Flora of Ceylon," part 5, by H. Trimen, continued by Sir J. D. Hooker.
- "Lectures on some of the Physical Properties of Soil," by R. Warington.

- 'The Book of Gardening: a Handbook of Horticulture,' ed. by W. D. Drury.
- 'Les Plantes de Serre,' par G. Bellair et L. Saint-Léger.
- 'Home and Garden,' by Miss G. Jekyll.
- 'L'Industrie des Fleurs Artificielles et des Fleurs Conservées,' par H. L. Alph. Blanchon.
- 'Genera Siphonogamarum ad systema Englerianum conscripta,' fasc. 1, 2, ab auct. Dr. C. G. de Dalla Torre et Dr. H. Harms.
- 'Monographien Afrikanischer Pflanzen-Familien und Gattungen,' herausg. von A. Engler; III. "Combretaceæ-Combretum," bearbeitet von A. Engler und L. Diels; also V. "Sterculiaceæ Africana," bearbeitet von K. Schumann.
- 'Die Baume und Sträucher des Waldes,' iii. Abth. 2ter Theil, von G. Hempel und K. Wilhelm.
- 'The Amateur's Practical Garden-Book,' by C. E. Hunn and L. H. Bailey.
- 'A Glossary of Botanic Terms with their Derivation and Accent,' by B. Daydon Jackson.
- 'Cyclopedia of American Horticulture,' vols. i. and ii., by L. H. Bailey.
- 'Traité historique, critique et expérimental des Rapports des Plantes avec le Sol, et de la Chlorose Végétale,' par J. A. Cl. Roux.
- 'The Century Book of Gardening,' ed. by E. T. Cook.
- 'Diseases of Plants,' by Dr. K. F. von Tubeuf, English ed. by Dr. William G. Smith.
- 'Agricultural Botany,' by J. Percival.
- 'The 1900' Supplement to the Dictionary of Gardening,' A-F, by G. Nicholson
- 'Die Mutationstheorie,' 1ster Bd., 1ste Lief., von Hugo de Vries



## DONORS OF PLANTS, SEEDS, &amp;c., TO THE SOCIETY'S GARDENS AT CHISWICK DURING THE YEAR 1900.

- ALDENHAM, Lord, Aldenham House, Elstree. Culinary and Sweet Peas. See p. 164 and p. 389.
- ARKWRIGHT, J. H., Hampton Court, Leominster. One Hardy Plant for Chiswick collection.
- BARNES, J. E., 9 Exchange Street, Norwich. Seed Potatos. See p. 379.
- BARR, Messrs., Covent Garden. Vegetable Seeds. See pp. 164, 168, 172.
- BENNETT-POE, J. T., Homewood, Cheshunt. Plants of *Celogyne cristata*, 'Trentham var.' Distributed to Fellows.
- BIRD, M. C. H., Stalham, Norwich. Tomato Seed. See p. 172.
- BLINCO, C. F., Derbyshire Lane, Hucknall Torkard. Seed Potatos. See p. 380.
- BONAVIA, Dr., Worthing. Nine packets of Seeds. See p. 381.
- BOURNE, R. W., 18 Hereford Street, London. Roots of Panama Pear. These have been potted, and will be grown on at Chiswick.
- BRADLEY, F. M., Church Street, Peterborough. Seed Potatos. See p. 168.
- BRETTON, Miss, Sandhurst, Berks. One packet of Seeds. Failed.
- BROMET, H., Tadcaster. *Dracæna* Plants. Used for stock purposes.
- BROWN, Messrs., Stamford. Seed Potatos. See p. 378.
- BURT, C. W., 25 Aberdare Gardens, South Hampstead. Twenty packets of Australian Seeds. Nearly all failed.
- CADDICK, E. W., Ross, Hereford. Seed Potatos. See p. 378.
- CHAMBERLAIN, J., Sketty, Swansea. Twenty packets of Australian Seeds. Nearly all failed.
- CHEAL, Messrs., Crawley. Tomato Seed. See p. 172.
- CHESTER, W., Chatsworth Gardens, Derby. One Vine. Planted in collection at Chiswick.
- CLAYTON, H. G., Grimston Park Gardens, Tadcaster. Seed Potatos. See p. 168.
- CROWLEY, P., The late, Waddon House, Croydon. Stove Plants Used for stock purposes.
- CULLEN, F. J., Witham, Essex. Culinary Peas. See p. 164.
- DEAL, Jun., W., Freering Hill, Kelvedon. Culinary Peas. See p. 164.
- DEAN, R., Ranelagh Road, Ealing. Stocks and Sweet Peas. See p. 388.
- DICKSONS, Messrs., Chester. Seed Potatos. See p. 168.
- DIRECTOR, Royal Gardens, Kew. One packet of West African Spinach Seed. See p. 381.
- DIVERS, W. H., Belvoir Castle Gardens, Grantham. Tomato Seed. See p. 172.
- DIXON, C., Holland House Gardens, Kensington. Cuttings of *Calceolarias* and Roots of *Dahlias*. For garden.
- DOBRIE, Messrs., Rothesay. Sweet Peas, *Phloxes*, Tomato Seeds, and Cactus *Dahlias*. See pp. 172 and 390.
- DOUGLAS, JAK., Great Bookham, Surrey. Carnation Seed. Planted in collection.
- DRUMMOND, Messrs., 57 Dawson Street, Dublin. One packet of Broccoli Seed. Report will appear in next volume.
- DRURY, W., Mount Hernion Road, Woking. One packet of *Helianthemum* Seed. Being grown on for distribution to Fellows.
- EVANS, J., Darley Dale, Matlock. Carnation Seed. Planted in collection.
- FIDLER, Messrs., Reading. Peas and Seed Potatos. See p. 164.
- FINNEY, Messrs., Newcastle-upon-Tyne. Culinary Peas. See p. 164.
- FITT, J. H., Colley Manor Gardens, Reigate. One plant of *Calceolaria violacea*. For garden.
- FORBES, J., Hawick. Flower Seeds and *Phloxes*. See p. 387.
- GAUNTLETT, Messrs., Redruth. Thirty-two Bamboos. For Garden.
- GLEESON, M., Warren House Gardens, Stanmore. Seven bottles of Serum Fluid. See p. 382.
- GODDEN, W. H., Pishiobury, Sawbridgeworth. *Dracæna* Plants. For stock.
- GODFREY, W. J., Exmouth. *Chrysanthemums*. See p. 385.
- GREEN, J., Dereham. Tomato Seed. See p. 172.
- GUILDFORD Hardy Plant Nursery, Millmead, Guildford. Alpine Plants. For garden.
- HARRIS, JAS., Swansea. Seed Potatos. See p. 168.
- HARRISON, Messrs., Leicester. Vegetable Seeds. See pp. 164, 171, 172.
- HENDERSON, Messrs., New York. Seeds of Dwarf Beans. See p. 177.
- HINCHES, R. S., Foxley, Hereford. Two packets of Seeds from Manitoba. Failed.
- HOFFMAN, R., Thurlow Lodge, West Dulwich. Seedling *Caladiums*. Distributed to Fellows.
- HOBBS, P., Enys, Penryn, Cornwall. Seed of *Magnolia Lennei*. Failed.

- HOLLINGWORTH, J., Woodseat, Uttoxeter. *Bougainvillea* and *Allainanda* Plants. For garden.
- HOLMES, R., Tuckswold Farm, Norwich. Tomato Seed and three tins of Fungicide. See p. 172.
- HUBBARD, Messrs., Sleaford. Seed Potatos. See p. 379.
- HUDSON, J., Gunnersbury House, Acton. *Dracenas* and *Salvias*. For garden.
- JAKSON, Messrs., 17 Philpot Lane, E.C. Seed Potatos. See p. 380.
- JOHNSON, Messrs., Boston. Culinary Peas. See p. 164.
- KENT & BRYLON, Messrs., Darlington. Broccoli Seed. Report will appear in next volume.
- KERR, W., Dumfries. Seed Potatos. See p. 378.
- LAXTON, Messrs., Bedford. Culinary and Sweet Peas and Strawberry Plants. See p. 164. The Strawberry Plants are growing in the collection, and will be reported upon next year.
- LLEWELYN, Sir JOHN, Penllergaer, S. Wales. Plants of *Rhododendron barbatum* Distributed to Fellows.
- LLOYD, L., Marlboro' Road, Chiswick. Yellow Horned-Poppy Seed.
- LYE, J., Easterton Market Tavington. Seed Potatos. See p. 379.
- LYNCH, R. J., Botanic Garden, Cambridge. Ninety-six packets of Seeds. Distributed to Fellows.
- MARSHALL, W., Auchinraith, Bexley. Plants of *Carex bunea variegata*. For stock purposes.
- MASTERS, Dr., Mount Avenue, Ealing. Twenty-eight packets of Vegetables. Received late, will be reported upon next year.
- MERCER, J., Hough Green, Widnes. *Dracena* Plants. For stock purposes.
- MORISON, M. S., Clowhurst, Torrington Park, North Finchley. Forty-eight Tea Plants. Distributed to Fellows.
- NORMANBY, Rev. Marquis of, Mulgrave Castle, Whitby. Tomato Seed. See p. 172.
- PAUL, Messrs., Cheshunt. *Phloxes*. Planted in trial collection.
- PENTON, W. J., Bowden House Gardens, Clippenham. Seed Potatos. See p. 168.
- PETTIGREW, W. R., Hewell Grange, Broomsgrove. One Zonal *Pelargonium*.
- PRITZER, W., Stuttgart. *Montbretia germanica*. See p. 387.
- POUPART, W., Twickenham. Roots of *Rhubarb Daw's Champion*. Planted in collection.
- PRICHARD, C., Grove Park Gardens, Chiswick. Hybrid Poppy Seed. See p. 387.
- PROUDLOCK, R. L., Government Botanical Gardens, Ootacamund. Thirty-seven packets of Seeds. Nearly all failed; those that grew were distributed to Fellows.
- RAVENSCROFT, B. C., Laxey, I.O.M. Tomato Seed. See p. 172.
- REYNOLDS, R., Cliffe Lodge, Hyde Park, Leeds. Seeds of *Actinotus helianthus*. Failed.
- REMER, F., Quedlinburg. Seed of *Helianthus cucumerifolius compactus*. See p. 387.
- SAGE, G. H., Bayham Abbey Gardens, Lamberhurst, Kent. Culinary Peas. See p. 164.
- SATE, J. C., Bulmer, Welburn, York. Culinary Peas. See p. 164.
- SHARPE, Messrs., Sleaford. Culinary Peas and Seed Potatos. See p. 164.
- SMITH, Rev. DARNLEY, Landscone Vicarage, Ashburton. Six new patent Fruit Pro-tectors. See p. 382.
- STRUGNELL, W., Root Ashton Gardens, Trowbridge. Apple-tree Grafts. Growing in collection.
- SUTTON, Messrs., Reading. Seed Potatos. See p. 168.
- TAIT, J., Lynchow, Carlisle. Tomato Seed. See p. 172.
- TAYLOR, M., Penbedw, Nannerch, Flintshire. Tomato Seed. See p. 172.
- THOMAS, O., Royal Gardens, Windsor. Tomato Seed. Received late, will be tried in 1901.
- TOD, H. M., 239 Goldhawk Road, W. Vine eyes. Planted in collection.
- TUDWAY, C. C., The Cedars, Wells, Somerset. One Pear-tree. Planted in collection.
- VAN ORMAN, Messrs., Lewis, Iowa, U.S.A. Three packets of Seeds. See p. 381.
- VEITCH, Messrs. JAS., Chelsea. Vegetable and Flower Seeds, *Phloxes*, *Cannas*, *Tulps*, and *Cactus Dahlias*. See pp. 164, 167, 168, 172, 177. The *Phloxes* and *Cannas* will be reported upon next year.
- VEITCH, Messrs. R., Exeter. Vegetable and Flower Seeds. See pp. 168, 172.
- WAKEFIELD, Mrs., Belmont, Uxbridge. Seedling Aster. Planted in collection.
- WATKINS & SIMPSON, Messrs., 12 Tavistock Street, Covent Garden. Tomato and Celery Seed. See pp. 172 and 376.
- WEBBER, E. R., St. Catherine's Hill, Worcester. Culinary Peas and Tomato Seed. See pp. 164, 172.
- WIGAN, JAS., Croimwell House, Mortlake. Four Greenhouse Plants. For Garden.
- WILLIAMSON, M. H., 2827 Calle Lucre, Belgravo, Buenos Ayres. Two packets of Seeds. Failed.
- WILSON, J. H., Handsworth, Sheffield. Tomato Seed. See p. 172



# EXTRACTS FROM THE PROCEEDINGS

OF THE

## ROYAL HORTICULTURAL SOCIETY.

### GENERAL MEETING.

JANUARY 9, 1900.

Mr. JOHN BENNETT-POE in the Chair.

*Fellows elected* (32).—Francis Alexander, Mrs. Adelaide Beech, Sir Delves Broughton, Mrs. Arthur Capel Cure, William E. Close, John Noble Collins, Mrs. Fletcher Cruickshank, Miss Drummond, Herbert W. Dunlop, Capt. Fergusson, Mrs. Freelove, Mrs. Fuller, W. J. Griffin, Countess of Harwood, Dr. P. Hensley, Robert Hilton, J. Bromley Howell, M.D., Mrs. Hussey-Freke, Mrs. Jessopp, Miss E. M. Littledale, Miss May Littledale, Miss A. V. Lister, Francis H. Lloyd, Lady Muncaster, R. C. Reginald Nevill, Walter Northover, Mrs. Wilson Pease, Miss T. W. Powell, Edward Roberts, F.R.A.S., William Seabrooke, Henry Spooner, T. Stone.

*Associates* (2).—H. Hall, E. Knowles.

*Society affiliated* (1).—Ilford Horticultural Society.

### GENERAL MEETING.

JANUARY 23, 1900.

Mr. GEO. BUNYARD, V.M.H., in the Chair.

*Fellows elected* (18).—Gerrard Ansdell, Edward M. Bethune, Miss Edith Bradley, Lady Darling, Sir Theodore Fry, Bart., Charles Gatehouse, J.P., W. H. Godden, Ernest Harris, Mrs. Carl Jay, James Kemp-Welch, Mrs. Manning, W. West Neve, W. K. Reed, Fred Sharpe, Mrs. Haig Thomas, William W. Ward, H. Wolrige-Gordon, J. H. Wood.

*Societies affiliated* (2).—Kidderminster and District Horticultural Society, Royal Berks Horticultural Society.

A lecture on "Ornamental Trees and Shrubs" was given by Mr. Geo. Bunyard, V.M.H. (See page 1.)

ANNUAL GENERAL MEETING.

FEBRUARY 13, 1900.

Sir TREVOR LAWRENCE, Bart. (President of the Society), in the Chair.

The Minutes of the last Annual General Meeting held on February 14, 1899, and also of the Special General Meeting held on July 21, 1899, were read and signed.

The following elections took place :—

Alexander Aikman, William C. Anderson, G. H. Andrews, A. E. Barnaart (Holland), Mrs. Frederic Bolton, Reginald S. Booth, Miss Winifred Bowen, Mrs. H. D. Brocklehurst, St. John Buchan (India), Miss E. A. Burdon, George Cadbury, Miss Christina M. Carlyon, Ernest Cheal, Miss H. Cobbold, Blair Onslow Cochrane, Arthur D. Cotton, Miss Darbyshire, T. Darling, F. Osborne Dobell, Mrs. Edmunds, O. V. Flatther, Mrs. W. H. Foster, Urban P. Giles, Mr. William Hales, Mrs. Benjamin Hannen, Miss Olive M. Harriison, T. W. Howard, James Howison, Edward Angus Johnson, M.D., Charles Kedgley, E. T. Marsh, J. W. McHattie, Henry Mitchell, Lady Monkswell, Lady Morris, Miss Mary Muhm, Miss Emilia Noel, W. A. Parton, H. A. Peters, Walter Raphael, T. B. Short, Mrs. Thomas Stanford, R. W. Struve, Philippe de Vilmorin (France), Arthur J. Walker, Mrs. Willis, W. E. Willis.

*Associates* (2).— F. W. Brow, A. J. Hawkes.

*Society affiliated* (1).—Great Warley Cottage Garden Society.

A vote of thanks to the retiring members of Council, Sir John T. D. Llewelyn, Bart., M.P., and Mr. R. McLachlan, F.R.S., was moved by Mr. Geo. Bunyard, V.M.H., and seconded by Mr. Assbee.

The President moved the adoption of the Report. This was seconded by the Rev. Professor Henslow, V.M.H., and spoken to by Surgeon-Major Ince, Mr. Cheal, Mr. George Paul, V.M.H., Mr. R. Dean, V.M.H., and carried unanimously.

[The Report itself will be found on the following page.]

F. Du Cane Godman, Sir John Llewelyn, Bart., M.P., and Arthur W. Sutton, Esq., V.M.H., were elected members of the Council.

The President, Treasurer, and Secretary were re-elected.

A vote of thanks to the Chairman closed the meeting.

## REPORT OF THE COUNCIL

### FOR THE YEAR 1899-1900.

The year 1899-1900 has been one of continued prosperity for the Society.

A large sum of money has been spent on the Lindley Library in recent years, and the Council have now had the books enclosed in glass-fronted cases for the double purpose of preservation and cleanliness. This has greatly improved the appearance of the Library.

A Catalogue has been published at the price of 2s. 6d., in the hope that many Fellows would purchase it, not only to inform themselves what books the Library contains, but also because it forms in itself a reference list to the bibliography of gardening. It would be gratifying if Fellows would also take note of books still wanting to the Library with a view to presenting them.

During the past year valuable books have been presented by the Director of the Royal Gardens at Kew, Dr. Maxwell Masters, F.R.S., Miss M. J. King, the Rev. Professor Henslow, V.M.H., Monsieur Correvoon, Monsieur Bois, and others, to all of whom the best thanks of the Society are due. A full list will be published on April 1 in the Society's *Journal*, vol. xxiii., Part 3.

A corrected list of the awards made by the Society to plants, flowers, fruits, and vegetables to the end of 1899 is being prepared, and will be issued during the coming year.

Application is frequently made to the Society by Fellows desiring to have special advice respecting their gardens. The Council have therefore resolved to add a right to this to the privileges of Fellowship and to send a competent inspector to report and advise at the following charges. viz. a fee of £2. 2s. for one day (or £3. 3s. for two days, when necessary), together with all out-of-pocket expenses). No inspection may take up more than two days.

Under the head of ordinary expenditure at Chiswick £1,810 has been spent on the general work and maintenance of the Gardens. The receipts by sale of surplus produce amounted to £330, making the net ordinary cost of the Gardens £1,480.

The Council wish to call attention to the good work being done at Chiswick under Mr. Wright's superintendence, not only in the Garden, but among the students. During the last two years, for example, of our Chiswick students one has taken a First Class in Honours in Science and Art, one a First in Advanced Botany, two a First in Elementary Botany, at South Kensington; one has been appointed Curator of the Botanic Gardens at Antigua; seven have taken a First Class in the R.H.S. Examination in Horticulture; two have set up in business for themselves; four have obtained positions at the Royal Gardens, Kew;

one at Kensington Gardens; two at Messrs. Veitch's; one at Messrs. Low's; three in other large nurseries; and one is editor, and another is on the editorial staff of a garden paper. Mr. Wright reports to the Council: "The demand for energetic, trustworthy young men from Chiswick is rapidly increasing: there is no difficulty in placing such in good situations, our supply being unequal to the demand; but they *must all be workers.*"

At Westminster twenty-one fruit and floral meetings have been held in the Drill Hall, James Street, Victoria Street, besides the larger Shows in the Temple Gardens on May 31, June 1 and 2, and at the Crystal Palace on September 28, 29, and 30. An International Conference on Hybridisation was held at Chiswick and Westminster Town Hall on July 11 and 12. Lectures and demonstrations have been delivered at nineteen of the meetings.

The number of awards granted by the Council, on the recommendation of the various Committees, will be seen from the following table:—

Award	Provincial Show	Purchased by Affiliated Societies	Temple Show	Hybrid Conference	Crystal Palace Fruit Show	On Recommendation of				Total
						Fruit Committee	Floral Committee	Oreoid Committee	Narcissus Committee	
Gold Flora Medal ...	—	—	—	1	—	—	—	—	—	1
R.H.S. Gold Medal ...	2	—	5	5	1	5	3	1	—	22
Silver Cup ...	—	—	21	—	1	1	—	—	1	24
Hogg Memorial Medal ...	—	—	—	—	1	—	—	—	—	1
Silver-gilt Flora ...	1	—	15	3	—	—	21	6	2	28
Silver-gilt Knightian ...	—	—	4	—	3	16	—	—	—	23
Silver-gilt Banksian ...	—	—	12	1	3	3	14	1	—	34
Silver Flora ...	2	16	2	—	—	—	53	20	4	97
Silver Knightian ...	—	—	—	—	3	18	—	—	—	21
Silver Banksian ...	1	39	13	7	4	10	59	34	3	170
Bronze Flora ...	—	10	—	—	—	—	10	—	—	20
Bronze Knightian ...	—	—	—	—	3	—	—	—	—	3
Bronze Banksian ...	—	22	—	—	—	2	14	6	—	44
First-class Certificate ...	—	—	9	1	—	9	11	33	2	65
Award of Merit ...	—	—	26	—	—	47	124	84	10	291
Botanical Certificate ...	—	—	2	—	—	—	—	14	—	16
Cultural Commendation ...	—	—	4	—	—	15	6	17	—	42
Highly Commended ...	5	—	—	—	1	—	2	—	—	8
Commended ...	—	—	—	—	1	—	—	—	—	1
Total ...	11	87	113	18	21	126	317	216	22	931

In addition to the above:—One Silver-gilt Flora has been awarded to Mr. H. H. Eaton for having passed first in the Society's Examination. Ninety-four Bronze Banksian Medals have also been granted to Cottagers' Societies.

The Council desire to draw the attention of Fellows of the Society to the more extended use which the Scientific Committee might be to them if they availed themselves more freely of their privileges in submitting instances of diseases of or injuries to plants caused by insects or otherwise. The Scientific Committee is composed of gentlemen qualified to

give the best advice on all such subjects, either in respect to the prevention or cure of disease. The Committee is also glad to receive specimens of any subjects of horticultural or botanical interest.

The Society's Great Show held in May (by the continued kindness of the Treasurer and Benchers) in the Inner Temple Gardens was as successful as ever; and it is a matter of satisfaction to the Council to find that this meeting is now universally acknowledged to be the leading Horticultural Exhibition of this country. The best thanks of the Society are due to all who kindly brought their plants for exhibition, or otherwise contributed to the success of this Show.

The International Conference on Hybridisation held at Chiswick and at Westminster Town Hall on July 11 and 12 was considered both by our home and also by our foreign guests to be an unqualified success, not only from the value of the papers read and communicated, but also from the pleasant opportunity it afforded for the meeting of horticulturists from all parts of the world. The Report of the Conference has been unavoidably delayed. It will form a distinct and very valuable volume of the Society's *Journal*.

The Exhibition of British-grown Fruit held by the Society at the Crystal Palace on September 28, 29, and 30 was, considering the very unfavourable season, most satisfactory. Full particulars will be found in vol. xxiii., Part 3, of the *Journal*, which will be issued in the course of a few weeks.

As an object-lesson in British fruit cultivation this Annual Show stands unrivalled, and is of national importance. Those who have visited it from year to year cannot fail to have been impressed by the wonderful advance which has been made in the quality of the hardy fruits exhibited; and as the importance of fruit-growing in this country cannot well be over-estimated, the Council invite Fellows and their friends to support them in their efforts to maintain and improve this Exhibition by visiting it and by subscribing to its funds. For it cannot be too widely known that the continuance of the Show is absolutely dependent on at least £100 being raised by subscription each year towards the Prize Fund. The Show involves the Society in a very large expenditure without the possibility of any financial return. The Council have therefore established the rule that they will not continue it unless sufficient interest in it is taken by Fellows and their friends to provide £100 towards the Prize Fund. And this will, in the coming year 1900, be even more important than heretofore, as the directors of the Palace have signified to the Council that they feel compelled to decrease their contribution by £50. A glance at the list of subscribers will show how small has been the interest taken by the bulk of the Fellows. The Council would point out that this is not a local Show with a few large prizes, but that a multitude of small prizes have been arranged in order to secure the best fruits in each section; special prizes have been allotted to market growers; and counties have been grouped in such a way that growers should not have to compete with exhibitors from localities more favoured by climatic conditions. These points will be still further extended should sufficient financial

support be forthcoming. Subscriptions should be sent at once to the Secretary, 117 Victoria Street, Westminster, and if the list prove satisfactory the Schedule will be issued in April, and the Show held on September 27, 28, and 29, 1900. The list of subscribers for 1899 will be published in Part 3 of vol. xxiii. of the Society's *Journal*.

An invitation was received and accepted for sending a deputation to visit a Show of Daffodils and other early spring flowers and produce held at Truro on March 21 and 22, 1899. The Council desire to express their best thanks for the great courtesy and hospitality with which their deputation was received in Cornwall.

The *Journal* of the Society has been continued so as to enable Fellows at a distance to enter more fully into and reap the benefits of the study and work of those actively engaged at headquarters. Vol. xxii., Part 4, and Parts 1 and 2 of vol. xxiii. were issued during the year. Vol. xxiii., Part 3, will be ready on April 1, and vol. xxiv., on the Hybrid Conference, as quickly as possible.

An examination in the principles and practice of horticulture was held on April 11, concurrently in different parts of the United Kingdom, a centre being established wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations would consent to act on the Society's behalf, in accordance with the rules laid down for its conduct. No limit as to age, position, or previous training of the candidates was imposed. One hundred and sixty-five candidates presented themselves for examination. The names and addresses of those who succeeded in satisfying the examiners, together with the number of marks assigned to each, will be found in the Society's *Journal*, vol. xxiii., page 64.

It is proposed to hold a similar examination in 1900, on Wednesday, April 25. Candidates wishing to sit for the examination should make application during February to the Secretary, R.H.S. Office, 117 Victoria Street, Westminster.

The thanks of the Society are due to all the members of the Standing Committees, viz. Scientific, the Fruit and Vegetable, the Floral, the Orchid, and the Narcissus Committees, for the kind and patient attention which they have severally given to their departments.

The thanks of the Society are also due to all those who, either at home or abroad, have so kindly presented plants or seeds to the Gardens. A list of the donors has been prepared, and will be found in the Society's *Journal*, vol. xxiii., Part 3, which will be issued on April 1.

The Council wish to express, in their own name and in that of the Fellows of the Society, their great indebtedness to all who have so kindly contributed, either by the exhibition of plants, fruits, flowers, or vegetables, or by the reading of papers, to the success of the fortnightly meetings in the Drill Hall. They are glad to find by the increased and increasing number of visitors that the Society's fortnightly meetings are becoming fully appreciated by Fellows and the public in general.

A desire having been expressed that the so-called fortnightly meetings should be actually fortnightly throughout the whole year, it will be found by referring to the Book of Arrangements, 1900, that the Council have acceded to this request as far as it was possible to do so, having regard to such obstacles to absolute regularity as the Temple and Crystal Palace Shows and the occurrence of bank holidays.

The lectures given at these meetings during the past year have been or will shortly be published in the *Journal*, and are as follows:—

- |       |    |   |
|-------|----|---|
| Jan.  | 31 | "The Orchards of Nova Scotia," by Mr. Cecil H. Hooper, F.R.H.S. |
| Feb.  | 28 | "The Colours of Insects," by Mr. H. L. T. Blake, F.R.H.S.       |
| Mar.  | 14 | "Experiments at Woburn," by Mr. Spencer Pickering, F.R.S.       |
| April | 18 | "Asparagus," by Mr. Geo. Norman, F.R.H.S.                       |
| May   | 2  | "British and Alpine Floras," by Mr. G. A. Newell Arber, B.A.    |
| June  | 18 | "Rock Gardens and Streams," by Mr. F. W. Meyer.                 |
| July  | 25 | "Seed Dispersal," by Professor Boulger.                         |
| Aug.  | 15 | "Pruning," by Mr. R. P. Brotherstone.                           |
|       | 29 | "The Soil and Plant Food," by M. Georges Truffaut.              |
| Sept. | 12 | "The Drought of 1898," by M. Ed. Mawley, F.M.S.                 |
|       | 26 | "Fruit Stations," by Mr. E. Luckhurst, F.R.H.S.                 |
| Oct.  | 10 | "Injurious Scale Insects," by Mr. R. Newstead, F.E.S.           |
|       | 24 | "Growth of the Fruit Trade," by Mr. George Monroe, V.M.H.       |
| Nov.  | 21 | "Fruit Growing in South Wales," by Mr. J. Basham, F.R.H.S.      |

Besides these lectures the Rev. Professor Henslow, V.M.H., has most kindly given several floral demonstrations short accounts of which have appeared in the *Journal*.

A very courteous proposal has been received from the Richmond Horticultural Society inviting the Council, with the Fruit, Floral, and Orchid Committees, to sit at Richmond, on the occasion of the local Society's Show in the Old Deer Park on Wednesday, June 29. This invitation has been cordially accepted, and the Committees will sit, and plants, &c., will be brought before them for certificate, exactly as if they were sitting at Westminster. Directions will be found in the book of "Arrangements, 1900."

Ever since the great revival of the Society in 1887, questions have from time to time arisen as to the legality of certain of the Bye-laws. It has been urged that this or that bye-law was *ultra vires*, because it was apparently in conflict with the Charter. And when recourse was had to the two Charters under which the Society is incorporated, the later (and therefore presumably the ruling) Charter was found to be so encumbered with matters relating solely to the South Kensington lease from the Commissioners of the 1851 Exhibition (which matters ceased in 1887 to have any further connection with the Society) that it seemed wellnigh impossible to separate the small residuum of the Charter that was still applicable to the Society's altered position from the mass of enactments which had become obsolete and irrelevant.

There appeared to be only two alternatives—either to abide by the existing Bye-laws, or to petition Her Majesty to grant a new Charter. The expense involved in the latter course has hitherto been an obstacle, but at the beginning of the present year (1899) the conditions of the Society's finances appeared to the Council to be such as to warrant a petition being made to Her Majesty for a new Charter, and a considerable part of the year has been employed in drawing it up. The petition to Her Majesty and a draft of a new Charter were submitted to a General Meeting of the Society held on June 21, 1899, and were unanimously adopted and ordered to be sealed with the Society's Seal and presented to Her Majesty the Queen.

The Council have much pleasure in announcing that, on the advice of the Privy Council, Her Majesty acquiesced in the Petition, and on the 14th day of November signed the Supplemental Charter, and ordered it to be sealed with the Great Seal of the Kingdom.

The Council have appointed a Committee to draw up a draft of new Bye-laws, which they hope to lay before a General Meeting at no distant date.

The subject of the celebration of the approaching Centenary of the Society in March, 1904, is naturally attracting considerable attention. After the consideration of various excellent projects (some of which, however, appeared impracticable on account of their expense), the Council have decided to recommend the acquisition of a new Garden in the place of Chiswick, as being, under all the circumstances, the best and most practical method of celebrating the Centenary. A garden for experiment and trial is an absolute necessity for the Society, and Chiswick has recently become so surrounded with buildings, and the atmosphere so heavily charged with smoke, that not only has the difficulty of cultivation enormously increased, but it is feared that the results obtained from the trials are rapidly ceasing to be reliable. It is therefore proposed to issue an appeal to all the Fellows, and to raise a Fund for the purchase of a more suitable site for a garden, in memory of the first hundred years of the Society's existence.

The Council fully recognise the advantage of the Society's possessing a hall of its own in which plants, flowers, and fruits can be seen by the Fellows under more favourable conditions, as regards light and space, than are possible in the building at present used for the meetings. They do not, however, as yet see their way to its attainment, but will be happy to consider any suggestions concerning it.

The Council have the sad duty of recording the death of fifty-four Fellows during the year, and among them they regret to find the names of the Duke of Westminster, Lord Clifden, Sir E. Frankland, F.R.S., Sir J. W. Kelt, Bart., Lady Howard de Walden, Lady Huntingfield, Lady Melville, General Berkeley, Major Mason, Mrs. Milne-Redhead, Miss De Leon, Mr. T. Francis Rivers, V.M.H., Mr. Malcolm Dunn, V.M.H., Monsieur Henri de Vilmorin, Herr B. Stein, Mr. S. Courtauld, Mr. T. W. Girdlestone, Mr. G. Fry, Mr. J. Saltmarsh, Mr. M. Cammell, Mr. W. H. Protheroe, Lord Penzance, Sir Henry Tate, Bart., Lady Vincent,

Mr. John Lee, Mr. J. H. Nix, Mr. Alfred Outram, Mr. James Martin, Mr. S. Spooner, and others.

The following table will show the Society's progress in regard to numerical strength during the past year :—

DEATHS IN 1899.				FELLOWS ELECTED, 1899.			
		£	s. d.			£	s. d.
Life Fellows.....	11	0	0 0	4 Guineas ...	7	29	8 0
4 Guineas .....	3	12	12 0	2 „ .....	156	327	12 0
2 „ .....	26	54	12 0	1 „ .....	490	514	10 0
1 „ .....	22	23	2 0	Associates .....	15	7	17 6
				Affiliated Societies	21	24	3 0
	62	£90	6 0	Commutations	6		
				= £115. 10s.			
					695	£903	10 6
				Deduct Loss.....		155	8 0
RESIGNATIONS.				Net Increase in Income...			
		£	s. d.			£	s. d.
4 Guineas .....	0	0	0 0			£748	2 6
2 „ .....	9	18	18 0				
1 „ .....	44	46	4 0	New Fellows, &c. .		695	
				Deduct Resignations and			115
	53	£65	2 0	Deaths.....			
Total Loss	115	£155	8 0	Numerical Increase .....		580	

A scheme for the affiliation of local Horticultural Societies was put forward a year or two since, and 120 local Societies have availed themselves of it. The Council express the hope that Fellows will promote the affiliation of local Horticultural and Cottage Garden Societies in their own immediate neighbourhood.

At the request of some of the Fellows the Council have arranged to send (in the week preceding it) a reminder of every Show to any Fellow who will send to the R.H.S. Office, 117 Victoria Street, Westminster, 24 Halfpenny Post Cards, *fully addressed* to himself, or to whomsoever he wishes the reminder sent.

The Council recommend that the salaries of the principal officers of the Society—the Secretary, the Superintendent, the Cashier, and the Assistant-Superintendent—should continue as heretofore.

The Programme for the ensuing year will be found in the “Arrangements for the Year 1900,” lately issued to all Fellows.

Subjoined is the usual Revenue and Expenditure Account, with the Balance Sheet for the year ending December 31, 1899.



# ROYAL HORTICUL

## ANNUAL REVENUE AND EXPENDITURE

Dr.

	£	s.	d.	£	s.	d.
To ESTABLISHMENT EXPENSES—						
Salaries and Wages ... ..	602	5	0			
Rent of Office ... ..	206	15	0			
Printing and Stationery ... ..	266	9	8			
<i>Journal</i> —Printing and Postage ... ..	703	6	10			
Postages ... ..	126	7	4			
Coal and Gas ... ..	4	4	2			
Donation to Auricula and Primula Society ...	10	0	0			
Miscellaneous ... ..	101	18	8			
Commission on Advertisements, <i>Journal</i> , &c.	27	10	0			
Painting Orchid Pictures ... ..	47	11	6			
				2,096	8	2
„ LINDLEY LIBRARY ... ..				131	5	9
„ EXPENSES OF NEW CHARTER... ..				122	0	6
„ SHOWS and MEETINGS—						
Rent of Drill Hall and Cleaning ... ..	120	11	0			
Temple Show ... ..	686	14	10			
Crystal Palace Fruit Show ... ..	302	1	5			
Hybrid Conference ... ..	211	13	11			
Labour ... ..	114	4	0			
				1,435	5	2
„ PRIZES and MEDALS—						
Rose Show ... ..	49	17	6			
Committee Awards, &c... ..	352	12	3			
Expenses, Floral Meetings and Conferences...	71	7	9			
				473	17	6
„ CHISWICK GARDENS—						
Rent, Rates, Taxes, and Insurance ... ..	221	18	7			
Superintendent's Salary ... ..	200	0	0			
Pension, late Superintendent ... ..	180	0	0			
Labour ... ..	718	14	0			
Implements, Manure, Soil, Packing, &c. ...	176	19	7			
Coal and Coke ... ..	203	14	6			
Repairs ... ..	21	8	10			
Water and Gas ... ..	26	2	1			
Miscellaneous ... ..	61	12	5			
				1,810	10	0
				6,069	7	1
BALANCE TO GENERAL REVENUE ACCOUNT				1,751	8	9
				£7,820	15	10

## TURAL SOCIETY.

ACCOUNT for the YEAR ending 31st DECEMBER, 1899.

Gr.

	£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS ... ..				4,846	6	6
„ SHOWS AND MEETINGS—						
Temple Show ... ..	1,421	6	6			
Crystal Palace Fruit Show ... ..	326	12	8			
Drill Hall Meetings ... ..	38	18	0			
Hybrid Conference ... ..	56	14	0			
				1,843	11	2
„ ADVERTISEMENTS IN <i>JOURNAL</i> ... ..	314	9	9			
„ SALE OF <i>JOURNALS</i> ... ..	51	7	0			
„ MISCELLANEOUS RECEIPTS ... ..	29	18	0			
				395	14	9
„ DIVIDENDS—						
Davis Bequest and Parry's Legacy ... ..	56	18	4			
Consols, £1,750 ... ..	46	0	8			
Local Loans, £1,700 ... ..	49	6	0			
Rupee Paper, 37,00 Rupees ... ..	77	19	8			
				230	4	8
„ INTEREST ON DEPOSIT ... ..				19	10	4
„ PRIZES and MEDALS ... ..				66	5	0
„ CHISWICK GARDENS—						
Produce sold ... ..	329	6	0			
Students' Fees ... ..	42	0	0			
Admissions ... ..	5	9	0			
Miscellaneous Receipts ... ..	42	8	5			
				419	3	5

£7,820 15 10

We have examined the above Accounts, and find the same correct.

(Signed) HARRY TURNER,  
JAMES H. VEITCH, } *Auditors*  
H. B. MAY,

HARPER BROS., *Chartered Accountants*,  
10 Trinity Square, Tower Hill, E.C.

January 8, 1900.



## GENERAL MEETING.

FEBRUARY 27, 1900.

Rev. W. WILKS, M.A., in the Chair.

*Fellows elected (27).*—Frank Bingham, Samuel Bostock, Henry Delves Broughton, Benjamin Bullock, John Butler, H. Newman Collard, W. Collins, John Connery, C. Brooke Crawshaw, J.P., Reginald Dela-Bere, L. Robert Erskine, R. Fletcher Hearnshaw, F.Z.S., C. Hoddle, Mrs. Hughes, Edward Mansfield, Countess of Mar and Kellie, Henry James Mason, Herbert Nash, Joseph William Partridge, Colonel Henry Platt, C.B., H. Miles Radcliffe, James C. Scott, Daniel Henry Shilson, Miss B. Swan, Henry Tanner, John Weathers, E. R. Webber.

A lecture on "Some of the Plants Exhibited" was given by the Rev. Prof. G. Henslow, M.A., V.M.H. (See page 15.)

## GENERAL MEETING.

MARCH 18, 1900.

Mr. CHAS. E. SHEA in the Chair.

*Fellows elected (17).*—H. P. Atkins, Mrs. Geo. Bulteel, Captain R. C. Daubuz, J.P., Mrs. Davies-Evans, John B. Dowson, Owen Edmond, Rev. D. Hayes, Rev. G. B. Hooper, F. W. Macdonald, H. M. Machhar, L.C.E., Alfred Mizen, Walter Oakley, Algernon Strickland, Michael Tomkinson, John E. Vine, Rev. John Waller, Miss Gertrude Webb.

A lecture on "The Evolution of Plants" was given by Mr. R. Irwin Lynch. (See page 17.)

## GENERAL MEETING.

MARCH 27, 1900.

Mr. GEORGE BUNYARD, V.M.H., in the Chair.

*Fellows elected (27).*—G. H. Addy, F.R.G.S., Harold T. Barnett, Mrs. J. H. Bartlet, Lovewell Blake, H. H. P. Bouverie, Alfred S. Brett, Mrs. A. S. Brett (Biddles & Co.), Mrs. Sarah Burgess, Lady Currie, Hon. Lady Digby, Charles Faulkner, Miss Edith Gaddum, Mrs. Guthrie, Mrs. S. F. Hammond, John Laws, George Musgrove, Thomas F. Peacock, Lady Peel, Mrs. Phelps, Thomas A. Rising, E. Steinkopff, John William Thelland, Louis M. Thudichum, Vincent B. Tritton, Jas. W. Watson, J. P. Webster, Herbert Thomas Weeks.

## GENERAL MEETING.

APRIL 10, 1900.

Rev. W. WILKS, M.A., in the Chair.

*Fellows elected (29).*—Mrs. Richard Assheton, R. H. Beamish, R. O. Curle, W. H. Dodgson, Paul Erselius, E. Focke, Edward S. Godsell,

Richard John Harford, Ernest Harry Hart, Abner Hassall, Charles W. Hubbard, James F. Hudson, M.A., Sir Henry Mather Jackson, Bart., Mrs. Langridge, Ernest G. Leycester, Mrs. Percy Macquoid, Lady Newton, Mrs. Oliver, Miss Katherine Pryor, Mrs. Purcell, Frederick James Quick, E. S. Rashleigh, Mrs. G. A. St. Croix Rose, Mrs. M. L. Sheridan, Mrs. Turnock, Thomas Waite, Theodore Walker, F.R.G.S., Mrs. H. Seng Ward, Evelyn Wootton.

*Associate* (1).—H. Mumford.

A lecture on "Some of the Plants Exhibited" was given by the Rev. Prof. G. Henslow, M.A., V.M.H. (See page 38.)

## GENERAL MEETING.

APRIL 24, 1900.

Mr. JOHN T. BENNETT-POE in the Chair.

*Fellows elected* (24).—Percival Birkett, Florent Claes (Brussels), Miss Sybil Combe, James Wallis Cox, John Finlay Fraser, Miss Goodwyn, Harry Green, Mrs. Grove, George Homfray, A. Kay, Reginald John Liston-Foulis, Mrs. R. T. Maillard, John Marnham, A. Munt, John Oswald, H. J. Pain, Mrs. Augustus Perkins, Chas. Phillips, William J. Sanderson, Col. E. G. Selby Smyth, Lady Margaret Spicer, Rev. C. F. Thomas, James John Upton, John I. Ward.

A lecture on the "Cultivation of the *Narcissus*" was given by the Rev. S. Eugene Bourne, B.A. (See page 39.)

## GENERAL MEETING.

APRIL 25, 1900.

Sir TREVOR LAWRENCE, Bart. (President of the Society), in the Chair.

The Secretary read the notice calling the meeting as follows :—

Notice is hereby given that a General Meeting of the Society will be held at 117 Victoria Street, Westminster, on Wednesday, April 25, at 2 P.M. :—

- (i.) To consider, and sanction if approved (either with or without addition, omission, or alteration), certain new Bye-laws rendered necessary by the Supplemental Charter recently granted to the Society.
- (ii.) To consider and adopt, if approved, the following resolutions, viz.—

(a) That in accordance with the recommendation adopted unanimously at the Annual General Meeting to celebrate the Centenary of the Society by removing the Gardens from Chiswick, this meeting adopts the proposal of the Council to purchase a freehold site in the parish of Limpsfield, in Surrey, and authorises the Council to take the necessary steps

for acquiring the said site, and for developing new gardens thereon.

(b) That this meeting authorises the Council to enter into negotiations with, and to obtain the co-operation of, the Board of Agriculture and Horticulture, the Universities of London, and the County Councils, with a view to the establishment in connection with or in affiliation to the Society of a representative School of Practical and Scientific Horticulture; the scheme to be duly submitted to the Fellows for approval.

Sir W. Thiselton Dyer proposed, and Dr. Maxwell T. Masters seconded, that the consideration of the Bye-laws be deferred.

This was carried *nemine contradicente*.

The President proposed, and Sir John T. D. Llewelyn, Bart., M.P., seconded, that this meeting confirms the recommendation of the Council made to and adopted unanimously by the Annual General Meeting, viz. that the Centenary of the Society be celebrated by removing the Gardens from Chiswick, subject to the Council being able to find a new site which recommends itself to the majority of the Fellows.

Mr. H. J. Elwes, F.R.S., proposed, and Mr. J. Weathers seconded, that the question of the proposed site of the new Gardens be considered in conjunction with the removal from Chiswick.

Mr. Henry Pearson suggested the addition of the last clause of the President's proposal (after the word "Chiswick"), which, having been accepted by the President and Sir John Llewelyn, was added to their proposal. This was then put to the vote and carried by a large majority.

Surgeon-Major Ince proposed a vote of thanks to the Chairman, which was carried unanimously.

## GENERAL MEETING.

MAY 8, 1900.

Mr. CHAS. E. SHEA in the Chair.

*Fellows elected* (44).---G. Bradford Adams, H. Bacon, A. Black, Mrs. Seymour P. Bouverie, Miss Ellen Briant, Walter T. Crampton, Miss Crane, Miss S. Crane, Herbert O. Crowther, T. R. Cuckney, Mrs. Horace B. Debenham, Thomas G. Dobbs, Frank Dodd, Miss R. E. Dugdale, A. B. Ebbs, Samuel T. Gaved, Mrs. Glazebrook, Mrs. F. Gleadow, Ernest John Harmer, William Hayward, George C. A. Jonson, John H. Kitchen, Mrs. H. N. Lubbock, William Markham, J. M. Mason, Cyril Merrick, Robert M. Miller, J.P., A. J. Munyard, Mrs. A. Munt, A. McDowell Nathan, William Neave, Mrs. R. Y. Phillips, Thomas Rigg, Miss F. D. Sanford, Louis Schiller, W. A. Sherwood, John Smith, William F. E. S. Stephens, Captain A. Vickerman, Mrs. A. W. Ward, Miss Francis A. Welby, Alfred Wilson, Mrs. Winkworth, H. A. Young.

A lecture on "Problems in Heredity" was given by Mr. W. Bateson, M.A., F.R.S. (See page 54.)

# THE TEMPLE SHOW, 1900.

MAY 23, 24, AND 25.

## JUDGES.

### ORCHIDS.

Messrs. H. J. Chapman.  
James Douglas, V.M.H.  
J. Gurney Fowler.  
H. Little.

### CUT FLOWERS.

Messrs. Richard Dean.  
E. Hill.  
Jas. Hudson.  
Geo. Paul.

### POT PLANTS IN BLOOM.

(Orchids, Roses, and Begonias excluded.)

Messrs. Wm. Howe.  
John Jennings.  
J. McLeod.  
Chas. E. Shea.

### ROSES AND BEGONIAS.

Messrs. W. Bain.  
C. R. Fielder.  
E. B. Lindsell.  
Rev. J. R. Pemberton.

### FOLIAGE PLANTS, PALMS, &c.

Messrs. J. H. Fitt.  
E. Molyneux.  
G. Norman.  
Owen Thomas.

### FRUIT AND VEGETABLES.

Messrs. E. Beckett.  
W. Crump.  
J. Smith.

## AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Fruit, Floral, and Orchid Committees will be found under their respective reports.

### *Gold Medal.*

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for Orchids.

To Lord Wantage, K.C.B., Lockinge Park, Wantage (gr. Mr. Fyfe), for fruit.

To Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. James Hudson, V.M.H.), for fruit trees and Water-lilies.

To Messrs. James Veitch, Chelsea, for Caladiums, Cacti, flowering shrubs, and hardy plants. (Figs. 42, 48.)

To Messrs. F. Sander, St. Albans, for Orchids, Azaleas, &c.

### *Silver Cup.*

To Messrs. J. Cypher, Cheltenham, for Orchids.

To Monsieur L. Linden, Brussels, for Orchids.

To Messrs. Charlesworth, Bradford, for Orchids.

To Messrs. Charles Turner, Slough, for Roses, Pelargoniums, and Carnations.

To Messrs. J. Carter, High Holborn, for Vegetables, Calceolarias, &c.

To Messrs. Barr, Covent Garden, for Tulips, herbaceous plants, &c.

To Messrs. W. Cutbush, Highgate, for topiary work, &c.

To Messrs. Fisher, Son, & Sibray, Sheffield, for stove and miscellaneous plants.

To Messrs. H. Low, Enfield, for Orchids and new plants.

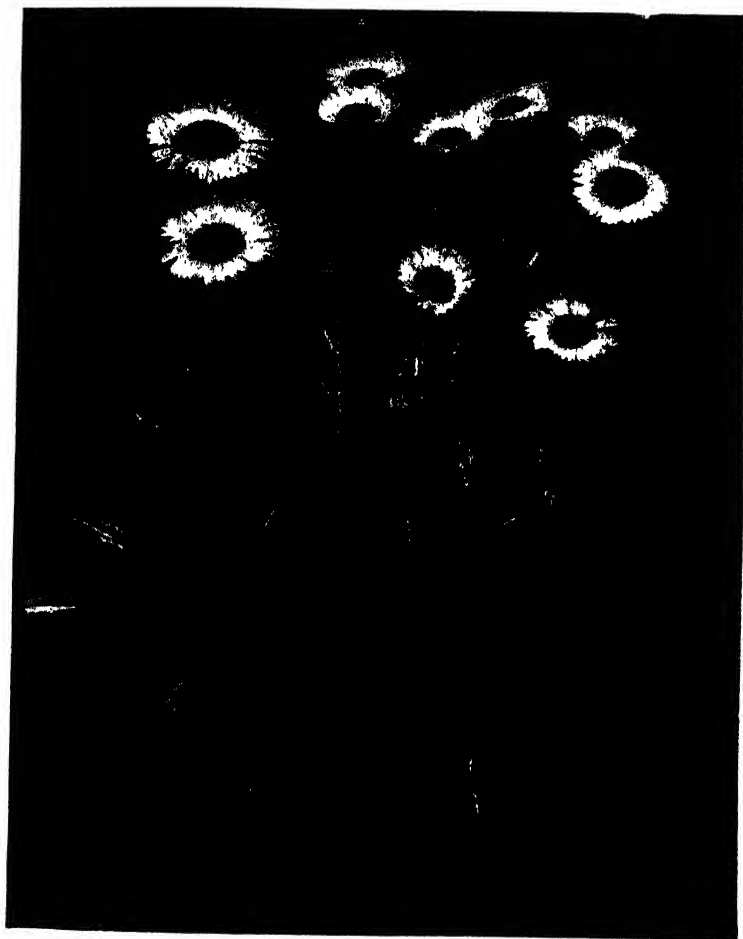


FIG. 42. — CELMISIA MUNROI. (*The Garden.*)

To Messrs. Paul & Son, Cheshunt, for Roses, cut flowers, and Bamboos.

To Sir Chas. Piggott, Bart., Slough (gr. Mr. J. Fleming), for Palms and Crotons.

To Messrs. R. Smith, Worcester, for Clematis and Roses.

To Messrs. J. Peed, Norwood, for Caladiums, Gloxinias, &c.

To Messrs. W. & J. Birkenhead, Sale, for Ferns.

To Messrs. J. Hill, Lower Edmonton, for Ferns.

To Sir J. Pease, Bart., M.P., Guisboro' (gr. Mr. McIndoe), for fruit.

To Messrs. T. Rivers, Sawbridgeworth, for fruit trees.

To Messrs. G. Bunyard, Maidstone, for fruit.

To Messrs. W. Paul, Waltham Cross, for Roses and Rhododendrons.

To Messrs. T. S. Ware, Feltham, for Begonias and herbaceous plants.

To Messrs. H. Cannell, Swanley, for Cacti, Cannas, &c.



FIG. 43. - CELMISIA SPECTABILIS. (*Journal of Horticulture*.)

*Silver-gilt Flora Medal.*

To Messrs. Stanley Ashton, Southgate, for Orchids.

To W. A. Gillett, Esq., Eastleigh (gr. Mr. E. Carr), for Orchids.

To Mr. H. J. Jones, Lewisham, for Begonias and hardy flowers.

To Mr. Rumsey, Waltham Cross, for Roses.

To Mr. Amos Perry, Winchmore Hill, for hardy perennials.

- To Messrs. G. Jackman, Woking, for Clematis and hardy perennials.
- To Mr. B. R. Cant, Colchester, for Roses.
- To Messrs. R. & J. Cuthbert, Southgate, for Azaleas.
- To Mr. Maurice Prichard, Christchurch, for herbaceous plants.
- To the Guildford Hardy Plant Company, for Alpines.
- To Mr. H. B. May, Upper Edmonton, for foliage plants and Roses.
- To Messrs. J. Waterer, Bagshot, for Rhododendrons.
- To R. J. Measures, Esq., Camberwell (gr. Mr. H. J. Chapman), for insectivorous plants.
- To the Duke of Northumberland, Brentford (gr. Mr. G. Wythes), for Nepenthes.
- To Messrs. J. Cheal, Crawley, for Cacti.
- To Messrs. R. Wallace, Colchester, for Lilies and hardy plants.
- To Messrs. Kelway, Langport, for Pæonies, &c.
- To Messrs. Sutton, Reading, for Calceolarias.
- To Messrs. J. Russell, Richmond, for trees and shrubs.
- To Leopold de Rothschild, Esq., Ascott, Leighton Buzzard (gr. Mr. J. Jennings), for Carnations.

*Silver-gilt Knightian Medal.*

- To Alex. Henderson, Esq., M.P., Faringdon (gr. Mr. W. L. Bastin), for fruit and vegetables.
- To Mr. John Watkins, Hereford, for Apples.

*Silver Flora Medal.*

- To Mr. W. Icton, Putney, for decorative plants.
- To Messrs. J. Laing, Forest Hill, for Maples and stove plants.
- To Mr. T. Jannoch, Dersingham, for Lilies of the Valley.
- To Mr. W. J. Poupert, Twickenham, for Lilies of the Valley.
- To Messrs. Thos. Cripps, Tunbridge Wells, for Maples.
- To Mr. R. Green, Crawford Street, W., for Crotons.
- To Messrs. B. S. Williams, Upper Holloway, for Orchids.
- To Ludwig Mond, Esq., Regent's Park (gr. Mr. J. O. Clarke), for Orchids.
- To Mr. G. W. Piper, Uckfield, for Roses.
- To Messrs. Frank Cant, Colchester, for Roses.
- To Messrs. Hogg & Robertson, Dublin, for Tulips.
- To Messrs. W. H. Rogers & Son, Southampton, for Rhododendrons.
- To Messrs. J. James, Slough, for Cinerarias.
- To Messrs. E. Webb, Stourbridge, for Begonias, Gloxinias, Calceolarias, and Streptocarpus.
- To Lord Gerard, Eastwell Park, Ashford, for Carnations.
- To Messrs. Backhouse, York, for Orchids, Alpines, &c.
- To Messrs. Fromow, Chiswick, for Maples.

*Silver Knightian Medal.*

- To Mr. S. Mortimer, Farnham, for Cucumbers.
- To Mr. W. Godfrey, Colchester, for Asparagus.
- To Mr. A. J. Harwood, Colchester, for Asparagus.

*Silver Banksian Medal.*

- To the Marquis de Wavrin, Belgium, for Orchids.  
 To Messrs. Dobbie, Rothesay, for Sweet Peas.  
 To Mrs. Bodkin, Highgate, for Cacti.  
 To Messrs. A. W. Young, Stevenage, for Cacti.  
 To the Misses Hopkins, Knutsford, for herbaceous plants.  
 To Mr. Paul Erselius, Romford, for Petunias.  
 To Messrs. Waveren & Kruijff, Holland, for Astilbes.

GENERAL MEETING.

JUNE 5, 1900.

Rev. W. WILKS, M.A., in the Chair.

*Fellows elected* (116).—W. H. Allen, J.P., William B. Alwood (U.S. America), Sidney H. Andrews, Miss Balfour, R. C. Bartlett, Lady Baynes, Miss Baxter, Mrs. Wheeler Bennett, Mrs. R. Benson, William Birch, Clement Boardman, J.P., Marchioness of Breadalbane, Thomas W. Brown (West Africa), Henry Budden (New Zealand), Alfred P. Childs, Harvey R. G. Clarke, Lady Stanley Clarke, Ernest Cannop, J.P., Francis Craze, Mrs. Creighton, J. W. Cunningham, Dr. F. Pritchard Davies, Arthur P. Davison, Edward Dent, J.P., James Dodd, Fred Dunn, Reginald C. Hart Dyke, Alfred H. Dykes, W. Eckstein, S. Eida, Mrs. M. de C. Elmsale, John Entwistle, Mrs. E. G. Farrer, T. Faulkner, J. J. Freeman, Countess of Galloway, M. Guldemon (Holland), Miss R. Hardcastle, Chas. B. Haywood, Walter Hoare, Mrs. M. E. Hobson, J. W. Hockey, E. Hudson, Mrs. Ferdinand Huth, W. W. B. Hulton, Mrs. Howard Hutton, Mrs. Jacob, Charles A. Jones, Charles A. Keith Falconer, Lady Sybil Knox, Alfred C. Leney, George Lewis, E. Turner Lloyd, James Lodge, W. R. Lysaght, Donald Maclean, Donald McAuley, James Henry Martin, Lord Medway, George Messer, W. A. Milner, Basil Montgomery, Mrs. Charles R. Mostyn-Owen, Thomas Munyard, Mrs. M. G. Murland, Miss F. Musgrave, J. W. Neall, John J. Norton, Frederick W. Osman, Edward M. Pearson, Sir Cuthbert Peel, Bart., Mrs. J. Denison Pender, Lady Philipps, Wyndham Portal, Alfred Pretty, Edward Pretty, Mrs. Radcliffe, George H. Lindsey Renton, C. G. Richardson, Roland Robbins, Mrs. Rose, F. W. Ruck, James M. Rucker, Lady Samuel, Mrs. W. A. Sandeman, Henry Schuster (Belgium), Mrs. Geo. Simpson, David P. Smith, Francis Smith, Thomas Smith, John P. H. Soper, John R. Stewart, Arthur J. Stiles, Arthur M. Strange, Charles Sweet, Donald Swift, Frederick A. A. Talbot, J. du Trieu de Terdonck (France), Henry P. Thurston, Mrs. A. Torrens, George H. Urmson, Arthur H. Vallance, P. A. Van der Bom (Holland), W. Ralph Walker, Spencer C. Walpole, Hon. Gerald Walsh, John Wark, W. Watson, Marquis Henry de Wavrin (Belgium), Miss F. Welch, W. Welch, Mrs. Gerald Wellesley, T. Wezelenburg (Holland), H. G. White, Mrs. H. Woodbridge, Lady Eva Wyndham-Quin.

*Associates* (2).—G. Cozens, G. Harrow.

A lecture on "Some of the Plants Exhibited" was given by the Rev. Prof. G. Henslow, M.A., V.M.H. (See p. 62.)

## GENERAL MEETING.

JUNE 19, 1900.

Mr. JAMES HUDSON, V.M.H., in the Chair.

*Fellows elected* (27).—Mrs. M. Arnold, Allanson Bailey, John Barton, Mr. Ernest Beadis, Mrs. Boreham, Arthur J. Bovell, Miss Theresa Buxton, John Chivers, Mrs. R. Colston, Thomas Cowern, F.I.S., M.C.A., Mynardus Devenish, Mrs. B. A. Dutton, F. C. Fowle, Mrs. Francis, Mrs. Goodden, Walter Heape, M.A., Mrs L. Holden, Mrs. H. A. Hore, Henry A. Hore, H. Macan, M.A., F.C.S., F. H. Nalder, Lionel Phillips, Captain Henry C. Bigaud, R.N., Edward Sandheim, H. E. Verey, Mrs. M. E. Wadham, C. Woodbridge.

*Society affiliated* (1).—Royal Horticultural Society of Victoria, Australia.

A lecture on "Aquatic Plants" was given by Prof. G. S. Boulger. (See p. 64.)

## GENERAL MEETING.

JULY 3, 1900.

Mr. GEORGE BUNYARD, V.M.H., in the Chair.

*Fellows elected* (19).—Miss Florence Baker, Lady Brassey, Francis Capel Cure, Horton Chapman, Edward P. Conran, Duke of Devonshire, K.G., Montague F. Dobson, H. N. Ellison, John Gardiner, J. Martin Hall, Miss Innes, G. W. Jevons, Joseph Lane, Lady Mostyn, Countess Munster, J. Ottowell Polley, Leopold de Rothschild, Robert Inigo Tasker, John Wood.

*Associate* (1).—W. Middlebrooke.

A lecture on "The More Varied Use of Roses" was given by Mr. Geo. Paul, V.M.H. (See p. 85.)

## SPECIAL GENERAL MEETING.

JULY 3, 1900.

Held at 4 P.M. in the Drill Hall.

Sir TREVOR LAWRENCE, Bart. (President of the Society), in the Chair.

The Secretary read the Minutes of the Special General Meeting held on April 25, which were signed by the Chairman.

The Secretary read the notice convening the meeting as follows:—

"A Special General Meeting of the Fellows of the Society will be held at the Drill Hall on Tuesday, July 3, 1900, at 4 P.M., for the purpose of adopting, with or without alteration or amendment, the following Bye-Laws for the Society."

The Chairman proposed to take the Bye-Laws chapter by chapter, and requested Fellows to mention under each chapter the particular Bye-Law which they proposed to alter or amend.

Chapter I. was adopted.

Chapter II.—On the motion of Mr. Alex. Dean all the words after the first occurrence of the word "Society" were omitted from Bye-Law No. 10. The chapter was then adopted.

Chapter III.—Dr. Masters suggested to change the word "horticulturists," in Bye-Law No. 16, to "men of science," and with this alteration Chapter III. was adopted.

Chapters IV., V., VI., and VII. were adopted.

Chapter VIII. was adopted as far as the end of Bye-Law No. 44. The Council then proposed alterations for Bye-Laws Nos. 45, 46, 47, 48, and Mr. Arthur Sutton formulated a new Bye-Law No. 49, which was accepted by the Council. Bye-Laws Nos. 45, 46, 47, 48, and 49 as thus altered, and after revision by the Society's legal adviser, were adopted with only one dissident.

The insertion of the new Bye-Law No. 49 in Chapter VIII. made it necessary to advance all the numbering of the further Bye-Laws by one.

Chapter IX.—On the advice of the Society's lawyers the following words were added to Bye-Law No. 67 (now 68), viz. "unless the Council shall have declared by resolution that his non-attendance has been due to unavoidable causes." With this addition Chapter IX. was adopted.

Chapter X.—Acting on the same advice, the Council proposed to add the following words to Bye-Law No. 76 (now 77), viz. "The names of all persons duly nominated for appointment to the office of Auditor, with the names of the nominators of each such person, shall be included in the list provided for by Bye-Law No. 73." The chapter was then adopted.

Chapters XI., XII., XIII., XIV., and XV., and the Appendix containing Forms A, B, C, and D, were adopted.

The Chairman then proposed, and Sir John Llewelyn, Bart., M.P., seconded :—

"That the Bye-Laws and Appendix as now revised be adopted as the Bye-Laws of the Society."

This was adopted, only three hands being held up against it.

[The full text of the Bye-Laws as revised and adopted at this meeting will be found in the Society's "Journal," vol. xxiii. p. 423.]

## GENERAL MEETING.

JULY 17, 1900.

MR. FREDERICK G. LLOYD in the Chair.

*Fellows elected* (14).—John Arkcoll, Mrs. John Arkcoll, Mrs. Boyd, Rupert D'Oyly Carte, Fred Davis, R. Core Gardner, Samuel Gratrix, Ernest R. P. Homfrey, Arthur Y. Lees, J. W. Moss, Mrs. Croft Murray, Mrs. Thornycroft, A. Ward, Maj.-Gen. Sir Francis de Winton.

*Society affiliated* (1).—Bristol and District Gardeners' Society.

A lecture on "Lilies" was given by Mr. R. Wallace. (See p. 98.)

## GENERAL MEETING.

JULY 31, 1900.

Mr. CHAS. E. SHEA in the Chair.

*Fellows elected* (25).—A. R. Allan, Reuben V. Barrow, J. Bruckhaus, Miss Dixon, Captain C. H. Fenwick, Miss Lillian Gibbs, F. Rutherford Harris, Miss Harrison, Percy W. Hooley, H. Ayres Horn, C. F. Hughes, Mrs. Hyde, Baroness Johan Knoop, Baron Johan Knoop, Charles F. Levens, J. L. Macfarlane, Mrs. C. F. Marsh, J. Maxwell, Alfred Norman, Arthur Norrington, Mrs. H. M. Power, Mrs. Scull, Percy Tarbutt, William H. Tolhurst, Mrs. Wallace.

A lecture on "Cherries and Plums" was given by Mr. H. Somers Rivers. (See p. 111.)

## GENERAL MEETING.

AUGUST 14, 1900.

Mr. P. CROWLEY, F.L.S., in the Chair.

*Fellows elected* (20).—Spencer Castle, F.R.G.S., Miss E. Eastwood, E. H. Evans, G. T. Flook, Lady Grove, James Harris, A. G. Hayman, Dr. C. A. Ironside, M.A., J. D. Lang, Mrs. E. C. Paton, Mrs. J. Phillips, Harry J. Powell, Mrs. H. J. Powell, Mrs. Pratt Barlow, H. Trafford Rawson, J.P., John H. Salter, J.P., Charles C. Seton, Mrs. Skottowe, W. H. Watts, J.P., P. Jagmohan Nath Zutshi (India).

A lecture on "Melons" was given by Mr. A. Pettigrew. (See p. 118.)

## GENERAL MEETING.

AUGUST 28, 1900.

Mr. HARRY J. VEITCH, F.L.S., in the Chair.

*Fellows elected* (4).—Hon. Mrs. Carpenter, Wilhelm Pfitzer (Germany), Frank Pratt Barlow, Stephen Pugh.

*Society affiliated* (1).—Normanby Horticultural Society (New Zealand).

A lecture on "Montbretias and Crocosmias" was given by Mons. Emile Lemoine. (See p. 128.)

## GENERAL MEETING.

SEPTEMBER 11, 1900.

Mr. HARRY J. VEITCH, F.L.S., in the Chair.

*Fellows elected* (12).—Joseph B. Bagehot, Mrs. Charles Bell, Rev. John L. Brack, William Cannon, J. Claude Daubuz, Frederick W. Dunston, Lewis Foster, Edwin B. Hadley, Rev. J. Montague Harris, Mrs. Emily M. Johnson, John F. Johnson, J.P., Charles Rhodes.

Owing to unavoidable circumstances the lecture on "Garden Manures" which had been announced for this date was postponed.

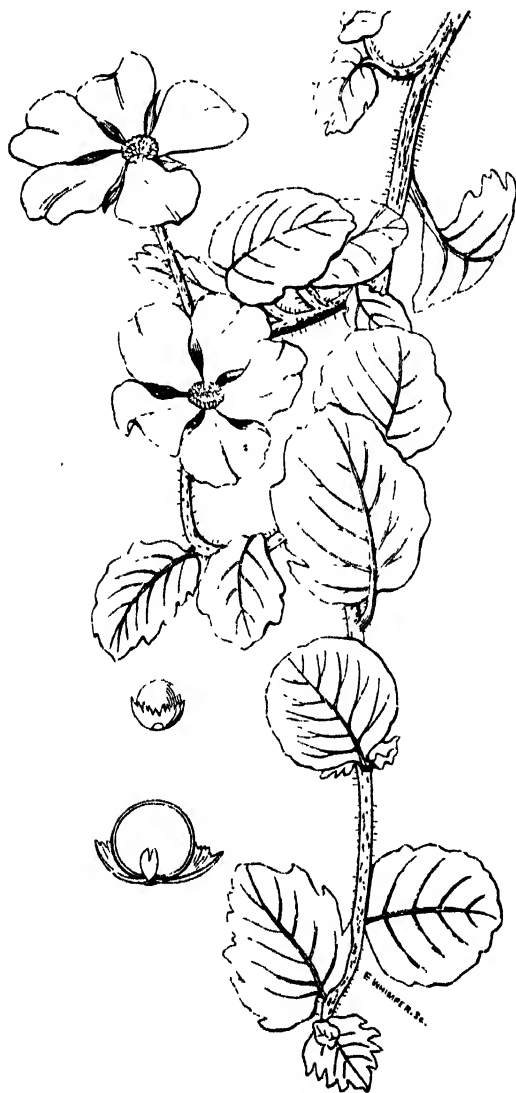
GENERAL MEETING.

SEPTEMBER 25, 1900.

Mr. EDWARD MAWLEY F. Met. Soc., in the Chair.

*Fellows elected* (8).—E. G. Cherry, William Dear, John H. Dover, F. S. Francis, William E. James, Col. A. R. Savile, Mrs. F. Seymour, Mrs. Mann Thomson.

A lecture on "Saving and Using the Rain" was given by Mr. Peter Kay (see p. 146)



## SCIENTIFIC COMMITTEE.

JANUARY 9, 1900.

Dr. M. T. MASTERS, F.R.S., in the Chair, and five members present.

*Horse-radish attacked by Rhizoglyphus.*—Roots of Horse-radish and Lily of the Valley, attacked by this mite, were received from Mr. Abbey, of Avery Hill, Eltham, who forwarded a long list of plants likewise attacked. Mr. Michael observed that it is a subterranean species, and that although it prefers bulbs it is very injurious to many—indeed, most other plants with fleshy roots, though it may not thrive equally well upon them all. As a remedy, Dr. Müller suggested lime and sugar or treacle, as being better and stronger than lime-water, as well as more persistent in its action. Mr. Michael also observed that heat, such as boiling water, was destructive, but the mite resisted chemicals to a remarkable degree. With regard to its life history, it passes through several stages, commencing with the egg; this gives rise to a hexapod lava, then to the nymph, a very active octopod. After a new change of skin in a large number of cases, but not in all, there emerges—without any discoverable cause—a being totally unlike the preceding, formerly known as Hypopus, having been thought to be a quite different genus. This has a soft body internally, but covered with a hard and usually chitinous integument. Its mouth organs are rudimentary, and it probably does not feed. It is provided with discs, by means of which it adheres to insects such as ants, bees, beetles, &c., and to other small moving creatures. These it utilises as means of migration, clinging to them, but without being parasitic. As soon as a suitable environment is met with the mite changes back into the last nymphal stage, and then proceeds to pass into the adult male or female condition. It may attack plants in all stages, except that of the migratory Hypopus. The Hypopus is practically impervious to chemicals, and can endure without injury exposure to heat and drought, which would destroy the creature in any other stage.

*Apples injured by Hail.*—Some fruit was received from Mr. Woodward, of Barham Court, Maidstone, which had received severe injuries from hailstones. But although the skin was cut through and the flesh exposed, this had dried up and so protected the interior, which had not at all decayed. The storm occurred on July 19, 1899. Mr. Michael observed that when birds plunge their beaks into Apples through thirst the injured spots almost invariably result in decay.

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SCIENTIFIC COMMITTEE, FEBRUARY 13, 1900.

Mr. BENNETT-POË in the Chair, and four members present.

*Elm-bark with larvæ.*—Mr. W. Brooks, of Weston-super-Mare, forwarded a piece of bark of an English Elm-tree, with the following observations:—The Elm-trees are attacked by an insect which is destroying them. Some of the trees are fine, nearly 100 feet high, and in their prime; others are smaller. The larger trees are attacked more especially

on the north side ; but the smaller all around the stem from bottom to top. One of the largest trees shed all its leaves in August, and it looks as if the whole of the trees will die.

Mr. McLachlan sends the following report :—"The Elms are attacked by the larvæ of a beetle. No perfect beetles are to be found in the bark sent, but there are numerous larvæ, each in a small cell, in which it will undergo its transformations. So far as can be judged from these larvæ, they are those of *Scolytus destructor*, so common in many places. In order to destroy them it was suggested, more than forty years ago, by the late Capt. C. J. Cox, that all the old outer bark be pared off by a spoke-shave or some similar instrument (the scrapings being of course collected and burnt), taking care not to injure the inner bark and wood. Dressings of dilute petroleum, repeated at intervals in dry weather, might also be of service. But the subject opens up a wider question, viz., whether the beetle is the cause of the condition of the trees, or only steps in where these latter are in a moribund state from some other cause. The writer of these remarks is inclined to think the beetles come as scavengers. At any rate, in the case of tall old trees, probably already 'stag-headed,' it is practically useless to employ remedial measures, and the best thing is to cut them down and burn them—or, at any rate, cart them away at once from the vicinity of trees not already attacked. The bark of such old trees is usually riddled by the larvæ from base to top. When the trees are younger and less tall, remedial measures, such as those suggested, might be tried. Even supposing the trees to be in an unhealthy state from some other cause, the attacks of the beetle must aggravate that state and hasten decay ; and if these attacks could be lessened or averted, there might be a chance of the trees recovering from the other conditions whatever they may be. But, as a rule, disease or decay have already proceeded too far before being discovered."

*Fern-roots attacked by grubs.*—Mr. Burt, Caenwood Towers, Highgate, sent a specimen of soil and grubs with the rhizomes of *Adiantum cuneatum*. Mr. Hudson observed that he was not unfamiliar with them. The specimen was forwarded to Mr. McLachlan, who reports as follows : "The grubs at the roots of *Adiantum* are those of a species of weevil, probably *Sitones*, but I cannot commit myself to anything more precise without seeing the perfect insects. I should think the best thing to do now would be to turn out the plants from the pots, shake the old soil from the roots, and repot in clean earth, taking care to burn all the old with the grubs. When the foliage shows signs of being attacked, go over the pots at night, turn each pot gently on its side, and shake the foliage over a sheet of paper. By this means multitudes of the perfect insects may be collected and destroyed, and the deposition of eggs prevented."

*Orobanche on Pelargonium.*—A plant in flower was received from Miss Frances M. Cooper, Forest Road, Wokingham, described as having "established itself in a pot of *Geranium*. The latter at first showed no sign of diminished vigour ; but now the specimen has come into bloom its host-plant seems to be weakly, and its leaves are turning yellow. The plant does not seem quite like any wild species." The *Orobanche* was of a purple colour throughout, but not agreeing closely with any true British species.

## SCIENTIFIC COMMITTEE, FEBRUARY 27, 1900.

Dr. M. T. MASTERS in the Chair, and five members present.

*The Lucombe Oak.*—Specimens of foliage and acorns were received from the Rev. J. H. Ward, of Silverton Rectory, Exeter, from a tree growing in the churchyard, requesting information as to their identity. Dr. Masters has supplied the following details:—"I believe the leaf and acorns exhibited to be those of the Lucombe Oak, or one of its descendants. The Lucombe Oak was a hybrid between the Turkey Oak (*Quercus Cerris*) and the Cork Oak (*Q. Suber*). The leaves are all but evergreen; indeed, in some of the varieties, quite so. As is the case generally with hybrids, the descendants from the first cross vary extremely; consequently there are many forms and varieties of the Lucombe Oak in existence. As the specimens came from Exeter there is additional ground for presuming it to be descended from the Lucombe, as the original tree was raised in the nursery of Messrs. Lucombe & Pince, of Exeter. The Fulham Oak, raised in the Fulham nurseries of Messrs. Osborne, had a similar origin, and now I believe it to be impossible to distinguish its descendants from those of the Lucombe Oak. A full account of these Oaks will be found in Loudon's 'Arboretum,' vol. iii."

*Large Yew-trees.*—Mr. Ward also mentions the fact of a Yew-tree in the same churchyard being 25 feet in circumference at a height of 4 feet from the ground, and asks if it is a reasonable conjecture that the tree was planted before the Norman Conquest. Data as to the rate of growth of Yew-trees have been supplied from trees planted in Basildon Churchyard in 1726. They have been measured in 1780, 1796, 1881, and 1889. They were found, after a commencing period of more rapid growth, to be pretty regularly increased by one line (one-twelfth of an inch) per annum (see *Nature*, October 17, 1899).

*Bulbiferous Scilla.*—A plant of *Scilla nutans* was received from Mr. Alex. Mortimer, 1 Paper Buildings, Temple, in which the outer bulb-scale had become greatly elongated upwards, forming a closed tube. It bore two small bulbs on the inner surface, and was greatly thickened at the summit, as if attempting to form a larger bulb; but no other than the above two were developed. They both possessed small, rolled-up, green leaves.

*Orange malformed.*—Dr. Masters showed an Orange having a band of paler colour, and smoother rind than the rest of the skin. It was referred to Dr. Bonavia for examination, who writes as follows:—"It somewhat resembles the Bigaradier tricolor Orange, which has a yellow skin, with orange stripes when ripe. Again, the Bigaradier Bizarrerie has smooth parts of an orange colour and warty parts yellow. These parti-coloured Oranges are normal." Dr. Bonavia would theoretically explain this peculiarity by referring to the "fingered" Orange, which he regards as a whorl of modified leaves, coalescing to form a covering to the inner portion of the fruit. To apply this theory to the case in question, he would compare the paler portion to, say, a *Euonymus*, which may have green leaves with an occasional yellow one, or again he would compare it with striped petals as of the York and Lancaster Rose. The objection to Dr. Bonavia's theory lies in the fact that the paler-coloured stripe did not

correspond with a single carpel, but covered the half of one and the half of the adjacent carpel, so it would represent two halves of different carpellary leaves. Secondly, striped flowers are probably the result of crossing two whole-coloured flowers. This is obviously the case with *Petunias*, a purple and white-flowered species having been the parents of all our garden forms. So that it would seem more probable that the Orange had received the pollen of a smooth-skinned variety, and the tubes penetrating one placenta, common to two adjacent carpels, had influenced the surface on both sides of the division. Similar stripes have been known to occur on the fruit of one variety, of *Theobroma* (Cocoa) when pollinated by a second variety (see next page, and also vol. xxiii. p. 388).

#### SCIENTIFIC COMMITTEE, MARCH 18, 1900.

Dr. M. T. MASTERS, F.R.S., in the Chair, and seven members present.

*Grapes diseased*.—Mr. Hudson brought some specimens which appeared to be attacked with the fungus *Glaeosporium*. Dr. Masters undertook to examine it further.

*Douglas Fir diseased*.—Branches were received from Mr. Rogers, of Penalowne, Cornwall. They were from young trees planted in an old plantation. In some cases the whole tree was unhealthy; but in others the trees grow vigorously, and only the top dies. They were referred to Dr. William G. Smith for examination.

*Pear Stem constricted*.—Mr. Rogers also sent a specimen remarkably constricted by a staple. The diameter of the stem, being 2 inches, was reduced to half an inch at the constriction. It had borne good crops of fruit up to last year.

*Abies amabilis attacked by Chermes*.—Dr. Masters showed specimens of this tree, also called *A. Lowiana*, with gouty branches. The bark was badly infested by an aphid much resembling that which attacks Beeches. The same remedy of syringing with petroleum emulsion is to be adopted if the trees be slightly infested; otherwise the only means of destroying the pest is to destroy the tree by burning.

*Hydnora africana*.—Dr. Masters also showed a specimen of this remarkable parasite. It is a fleshy, leafless plant, parasitic upon plants of the genera *Cotyledon* and *Euphorbia* in tropical and South Africa. There are about eight known species. The specimen was received from Grahamstown.

#### SCIENTIFIC COMMITTEE, MARCH 27, 1900.

Dr. M. T. MASTERS in the Chair, and seven members present.

*Fringed Cyclamen*.—Dr. Masters exhibited, from the collection of *Cyclamens* brought by the St. George's Nursery Co., Hanwell, to the Drill Hall, a leaf of their fringed *Cyclamen*, in which not only the flowers were fringed, but the leaves were deeply lobed, and the lobes themselves were lobulate and bilobulate, the ultimate lobules being irregular in size and, in some instances, shortly stalked, thus presenting an appearance

similar to that of curled Parsley, or of some of the varieties of *Scolopendriums*. It was stated by the raisers that the subdivision of the leaves was observed originally on plants bearing flowers of the ordinary character, and subsequently on those which had fringed flowers. Continuous selection through some seven or eight years had at length resulted in the production of plants in which the foliage and the corolla were equally deeply fringed.

*Rose-leaves*.—Some Rose-leaves were sent for an opinion. They had been grown under glass, and presented no appearance of insect or fungus, but were thin in substance, and partly destitute of chlorophyll, showing that the nutrition of the plants was impaired, but from what cause could not be ascertained.

*Vine-leaves diseased*.—With reference to the samples sent to the last meeting from Gunnersbury, it was stated that in the opinion of Mr. Massee the appearances were consistent with the attacks of red-spider or punctures of aphides. The leaf-buds were observed by Mr. Massee to be infested with mites.

*Viburnum with Hypertrophied Branches*.—A specimen was sent by Mr. Richard Dean, who stated that the whole tree was covered, at intervals of a few inches, with globose, nodulated, somewhat fleshy excrescences the size of a large Cherry and upwards. It was referred to Dr. William G. Smith for examination.

#### SCIENTIFIC COMMITTEE, APRIL 10, 1900.

Dr. M. T. MASTERS in the Chair, and six members present.

*Vine-leaves diseased*.—With reference to the samples brought to a previous meeting from Gunnersbury, Dr. Masters observed, from further examination, that they were certainly not attacked by red-spider, but possibly by mites. There was still some doubt as to the presence of the young condition of *Gleosporum*.

*Orange striped*. With reference to the Orange brought to a previous meeting, Dr. Bonavia writes further in regard to the criticism of his theory that the stripe did not correspond to a single carpel, but covered halves of two :—"If this be so, I think that fact would seem rather to strengthen my theory, for the law of phyllotaxis [alternation of whorls] would appear to require such a disposition. My view is that the peel and pulp with carpels are *two independent* whorls, the former coalescing to form a protective covering, while the latter has its carpels separable." The difficulty in accepting this theory arises from the fact that there is no mark of separation, the spongy tissues being continuous from the ovary cells to the circumference, the latter being charged with oil glands. Secondly, if the superficial layer were 'foliar' one would look for fibro-vascular cords running through it, whereas there are none. All that are present permeate the soft tissue. Lastly, if it were foliar it must represent a whorl of stamens; but where such a whole takes on a pistillate character, they form short horn-like processes around the base only, and not a uniform covering."

*Mandarine Oranges striped*.—Mr. Hudson brought some fruit which always had slightly raised ridges, on a line with the backs of the carpels, and green. They proved to be quite superficial, only retaining the chlorophyll grains, which had disappeared elsewhere.

*Acorn with three Embryos*.—Mr. Sewell, of Buckhurst Hill, Essex, on growing an acorn in water found that it sent up three stems. They proved to arise from three distinct embryos within the common husk. Such polyembryonic conditions occasionally, but not very frequently, occur.

*Douglas Fir diseased*.—Dr. Smith reports that the portions of trees sent exhibit attack by the fungus *Phoma pithya*, Saccardo. The twigs bear numerous black points, which, under the microscope, are seen to be receptacles containing the filaments from which the tiny one-celled colourless spores or conidia of this *Phoma* are given off. The fungus appears to infect the bark of young shoots unfolding from the bud; the twig may grow for several years; hence the diseased part, as is shown by specimens, may occur on twigs several years old. The fungus grows slowly under the bark which dies, and no new rings of wood are formed; the twig, however, continues to increase in thickness below and frequently also above the diseased area, which thus shows as a constriction. After the fungus has ringed the twig, all green parts die off, and the needles fall, as in specimens. There has also been an abnormal formation of resin in the bark of diseased parts; hence the resin boils, many of which have burst, leaving open wounds. The disease was first ascribed to this fungus by Rostrup about 1885; later descriptions of its occurrence on Douglas Fir in North Germany were given by Boehm (1896). I only know of one record for Britain, by Professor Sommerville ("Trans. R. Scottish Arboricultural Soc.," vol. xv. 1894, p. 191). The fungus is nearly related to *Phoma abietina*, described by Robert Hartig as a disease on Silver Fir. Other species of *Phoma* occur on Conifers.

Nothing definite has been done in the way of remedy. Two courses appear possible:—(1) Destruction of young trees attacked low down; if the attacks be recognised early, diseased parts might be pruned without disfiguring the trees; (2) spraying with a fungicide, but with which one requires to be ascertained by experiment.

*Potatos diseased with Scab, &c.*—Dr. Smith also reports on samples received from Mr. Escombe, Penshurst, in August, 1899. Prolonged cultivation of the fungi showed several species, so that it was difficult to detect which was the primary cause of the disease. "The skin of the Potato bore two distinct forms of disease: (1) scab, the cause of which is not yet known; (2) dark brown bodies adhering to the skin, called *Rhizoctonia solani*, being a mycelium of some unknown fungus. Other fungi present appeared to be the Potato dry-rot (*Fusarium solani*) and the Potato mildew (*Phytophthora infestans*)." Dr. Smith proposes to continue the culture, and to add a further report hereafter. Mr. Hudson observed that scab frequently appears on Potatos when pig manure has been added to the ground. Such would appear favourable to the fungus which causes it.

## SCIENTIFIC COMMITTEE, APRIL 24, 1900.

Dr. MAXWELL MASTERS in the Chair, and six members present.

*Ash-shoots barked by Hornets.*—Mr. McLachlan exhibited growing shoots completely ringed by hornets. This is apparently a rare occurrence, but the Chairman recorded a similar instance which had come under his notice in Messrs. Lee's nursery at Isleworth many years ago.

*Fasciated Roots of Aloe sp.*—From Mr. Justus Corderoy came specimens of pot-bound Aloe-roots, some of which were markedly fasciated. Fasciation so common in stems is very rare in roots, only two or three instances being recorded, viz., in *Spiræas* and in some epiphytal Orchids.

*Umbellate Primrose.*—Mr. Arthur Sutton sent a flower of this variety, at one time confused with the Oxlip.

*Evolution Committee.*—Mr. Bateson, F.R.S., attended as a delegate from the Royal Society to bring before the members of the Committee some explanations of the kind of work which it was hoped some cultivators might be disposed to undertake, with a view to the accurate observation and, where possible, measurement of variations in the plants under their care. A raiser of Chinese Primroses, for instance, might keep under observation all the variations that arise, measure and draw or photograph them before throwing them away, so that we should have some record of the intermediate stages between the original forms and the variety thought worthy of perpetuation.

## SCIENTIFIC COMMITTEE, MAY 8, 1900.

Dr. M. T. MASTERS in the Chair, and six members present.

*Peach-trees diseased.*—The following report was received from Dr. W. G. Smith upon the specimens received on March 26. He also observes that he is continuing the cultures of the fungi, as at present he is uncertain between Fruit-rot (*Monilia fructigena*) and a form of *Cladosporium*. "The cause of discoloration of the bark of the twigs is evidently a fungus which can be found in these parts. The absence of good examples of reproductive organs renders identification uncertain. In the twigs the fungus has passed the winter, and made its way into the leaf-buds and flowers, causing the damage there. With a fungus such as this the course of treatment is summer spraying. Peach foliage is delicate, and the spraying solution must be dilute; for example, Bordeaux Mixture made with not more than 2 lb. copper sulphate and 2 lb. quick-lime in each 50 gallons of water. The foliage should be thoroughly wetted with a fine spray, preferably that given with a sprayer like those supplied by Strawson and other firms. In winter pruning should be carried out, so as to remove all discoloured twigs. This treatment will probably require to be carried out for several seasons. The fungus might be identified if specimens of foliage were sent during the summer."

*Vine-leaves diseased.*—With reference to those sent to a previous meeting, from Gunnersbury, Dr. Masters observed that no mites could be detected by Mr. Michael, who had carefully examined them: and

therefore his opinion was confirmed that the diseased condition of the berries was most probably due to a young condition of *Glaeosporium*.

*Larix occidentalis*.—Dr. Masters showed young cones of this species from Oregon, characterised by having green bracts, the European Larch having them of a red colour. It is described as the finest timber tree of N.W. America. It was discovered by Douglas, who mistook it for the European species.

#### SCIENTIFIC COMMITTEE, JUNE 5, 1900.

Dr. M. T. MASTERS in the Chair, and four members present.

*Tulipa Gesneriana* diseased.—Some roots received from Mr. Mann, Penhill Close, Cardiff, were forwarded to Dr. Wm. G. Smith for examination and report.

*Iris* with diseased Roots.—Mr. Wilks brought some plants showing premature decay in the foliage. He observed that he had received reports from all parts of England of a similar condition among Irises of all sorts. The roots appeared to rot close to the rhizome. They were also sent to Dr. Wm. G. Smith.

*A synanthic Odontoglossum*.—A flower from a spray on a plant of *O. triumphans*, sent by Mr. Pitt, illustrated the twin condition of two coherent flowers; the columns, however, were free from each other above the combined ovaries, as well as the two labellums.

*Fendlera rupicola*.—Mr. Gumbleton exhibited a flowering branch of this unique shrub, there being but one species to the genus. It is a native of Texas and New Mexico, and a near ally of *Philadelphus* or *Syringa*, as popularly known; but while the ovary is inferior in the latter genus it is superior in *Fendlera*.

#### SCIENTIFIC COMMITTEE, JUNE 19, 1900.

Dr. M. T. MASTERS in the Chair, and four members present.

*Rose-rust*.—Some leaves sent by the Rev. H. C. Brewster, of South Kelsey Rectory, were attacked by an æcidium. Mr. Plowright reports that it is "the æcidiospore of *Phragmidium sulcorticatum*, formerly called *Uredo effusa*, or *miniatum* of older writers. These æcidiospores are often preyed upon by some mites, as in the present case, which become tinged with the orange colour of the spores, which they eat. On some of the leaves the uredospores are beginning to appear."

*Potato Crop defective*.—Mr. F. H. Kettle, of King's Ford, Colchester, forwarded samples, of which he writes:—"The Potato crop in this district is a very uneven one, and various reasons are suggested for it." The specimens sent are 'Bressee's Prolific,' and they are typical of plenty of others in the store room. The samples were forwarded to Mr. A. Sutton, who reports as follows:—

"In reply to your inquiry, it is quite certain that Mr. F. H. Kettle is by no means singular in his experience of Potatoes coming up very unevenly this season. We hear from all parts of the country that such is the case, and

all varieties appear to be suffering more or less from the same cause. Professor Gordon, of the Cheshire Agriculture and Horticulture School, Holmes Chapel, wrote to us recently on the same subject, saying that many of his Potatos had only formed very weak spindly sprouts, no thicker than a knitting-needle, and there were a great many blanks in his crop; and his experience is the same as ours, that many of the tubers are quite sound and hard in the ground where they have made the thin weakly sprouts complained of.

"It is remarkable that tubers which were 'boxed,' and very carefully sprouted before being planted, are just as much affected as those which were planted before any sprouts were made by the sets.

"Another interesting fact noticed on comparing many hundreds of samples is that the only case where Potatos have started well, with strong and healthy growth, are those which were grown last year in Scotland, where the climate and soil are comparatively moister than in England.

"The only conclusion I can arrive at is, that in consequence of the excessive drought last year Potatos ripened prematurely, and owing to this the sets are not able to develop a healthy and vigorous growth this year. We find this especially the case with Potatos which were grown last year on hot gravelly soils. The tubers affected in many cases produced shoots at the crown of the set, but these died off, and the later growth is being made from weakly shoots put forth by the side buds or eyes near the stem-end of the set.

"I can think of no possible remedy, and certainly in our experience we can remember no season when crops were similarly affected on so large a scale.

"Mr. H. S. Daine, of Woolfall Hall, Huyton, Liverpool, mentioned at the York Show that his crop was suffering in the same manner, and he had sent tubers to Professor Marshall Ward for examination, and would let us know his reply."

*Carnations decaying.*—Plants which had decayed at the base were received from Mr. R. Keeble, of The Pines, Horsall, Woking. Mr. Jas. Douglas reports upon them as follows:—

"It is not an uncommon occurrence to find that Carnations grown under artificial conditions will die, as the example enclosed has done. There is no disease; the roots have died owing to over-watering, or else, probably, the plants were allowed to become overdry; in this case the delicate root-hairs are desiccated, and thus rendered useless. Too much water is then poured in, which makes matters worse. All plants suffer from this, and some die. Moreover, the dried peaty soil is unsuitable for Carnations. In my own large collection we lose a few every year; the roots perish from some cause not always easily determinable, but I regard it as a matter of watering. The use of artificial manure in the soil will cause deaths in Carnations when grown in flower-pots. I dropped the use of it because of this."

*Grapes scalded.*—Mr. H. Pethick, Trewartha, Weston-super-Mare, sent samples, upon which Mr. Douglas reports as follows:—

"The Grapes sent are scalded, caused by insufficient ventilation, and probably too much moisture in the house. It occurs if the Grapes are entirely shaded by the leaves, and the Grape that suffers most from

scalding is 'Lady Downe's Seedling.' The vine may be flourishing in every respect, but that does not matter; and it always happens when the berries have just passed through the stoning period previous to colouring. While stoning is going on—that is, the hardening of the seeds—the berries do not increase in size: they remain stationary for five or six weeks. At the end of that time the seeds have come to their full development, and the berries increase rapidly in size. This is the time that scalding will happen. It can easily be prevented by throwing open the ventilators to their full extent in hot weather. Ventilation to a less extent should also be given at night. I should add that the berries will scald even if the sun does not touch them."

*Rose variegated.*—Mr. G. Rawlings sent specimens of Rose-leaves, variously spotted with yellow, some leaflets being entirely yellow-orange in colour. He writes as follows:—

"The leaves sent are from a tree of Baroness Rothschild, a portion of which came variegated last year. I budded a few buds on some named varieties, from which those sent have been cut. They are much more highly coloured than those on the original tree."

*Pears blackened.*—Some fruits, decayed, black, and attacked by fungi, were sent to Dr. W. G. Smith for examination. They were received from Rev. H. W. Fletcher, Bicker Vicarage, Boston.

#### SCIENTIFIC COMMITTEE, JULY 17, 1900.

Dr. MASTERS in the Chair, and two members present.

*Carnation-leaves injured.*—Leaves were received from Scarborough upon which Mr. Douglas reported as follows:—

"The three leaves seem to be scalded, but this might not have happened if the leaves had been healthy. They are not so. The weather has been unfavourable to Carnations in some places. These may have been badly cultivated. Probably they had too much water or insufficient ventilation. With healthy plants and ample ventilation scalding does not take place. The eruption or raised process on the single leaf is similar to what occurs on Vine-leaves when the atmospherical conditions are bad viz., too much moisture and too little ventilation. No plants suffer so much from insufficient ventilation as Carnations, and a moderately moist atmosphere is injurious. This may account for both the ailments in question."

*Apple-tree attacked by Caterpillars.*—Specimens were received from Mr. Abbey, Avery Hill, Eltham, upon which Mr. McLachlan reports as follows:—

"I only found one larva in the Apple shoots, and that appears to be some kind of Tortrix. It is often hard to name these things without seeing the insect they produce. Apple-trees just now are infested with larvæ of various kinds, and not the least destructive is that of the winter moth, but I do not see it in the box. Hand-picking is all very well in its way, but I should strongly recommend spraying the trees, if not too large, with some of the insecticides recommended in the gardening papers. It

is late, but even now it might do good. As a rule two or three applications at intervals of a fortnight or so are necessary, and it should be done in dry weather. The solutions used in spraying are generally poisonous but they do no harm to the fruit when in a young state, and they render the foliage deadly to insects hatching from eggs laid on the trees. It soon disappears, but has done its work in the meantime. Spraying is used enormously in America; less so here. Of course some ordinary common-sense care should be exercised, as with any poison."

*Strawberry-leaves diseased.*—Mr. G. Lee sent some leaves attacked by the fungus *Sphaerella fragariae*, "Strawberry-leaf blight." It is a very destructive disease recorded from all parts of the United States and illustrated in "Diseases of Plants," Tubeuf & Smith, p. 215.

*Dahlia Synanthic Sport.*—Mr. Evan Davies, Bromley, Kent, sent a remarkable specimen of twin Dahlia blossoms united back to back on coherent flower-stalks. One blossom was yellow, with crimson centre; the other entirely crimson. Which was the sport was not stated, but probably the latter.

*Aster Seedlings diseased.*—The following report was received from Dr. W. G. Smith on samples sent by Mr. Basham, Bassaleg, Newport, May 7.

"This disease begins at the neck of the plant or below the ground, and travels upwards through the plant, producing as it goes discoloration and softening of the tissues. There is fungus growth on all discoloured parts, and I believe the mycelium is the cause of the disease: it can be observed at the limit between discoloured and still green parts. Spores are produced of an oval form and colourless, a form which gives little assistance in identification. Nematode eelworms were also observed, but it is not easy to say what part they play: I should say they lived on the decaying parts. It should be mentioned that the Rev. Hilderic Friend ascribes the Aster disease to a type of parasitic worm, but I did not observe this form. The cause of this Aster disease has not yet been satisfactorily cleared up in any papers I know."

*Tulips diseased.*—Bulbs received from Mr. Maine, Penhill Close, Cardiff, were forwarded to Dr. Smith, who now reports as follows upon them:

"The plants received are infected with the Tulip Botrytis disease. The black bodies embedded in the bulb scales and dead leaves are the resting stages of a fungus which in its active stage has the form of reproductive organs known as Botrytis. It is a common disease, and this year I have reported on several cases, especially on Narcissus. On June 2, in the *Gardeners' Chronicle*, I recommended a somewhat similar treatment to that found successful by your correspondent—namely, to lift the bulbs after the flowering season, keep them in a dry place, or in some mixture of lime or sulphur, and to treat with sulphur before replanting. There seems to be no other way open to deal with this type of fungus. The disease evidently occurs on certain kinds of soil, but exactly what kind I cannot say yet."

## SCIENTIFIC COMMITTEE, JULY 31, 1900.

Dr. M. T. MASTERS in the Chair, and four members present.

*Diseased Peaches.*—Mr. Rogers, of Bridge Hall, Bury, sent samples attacked by the "Peach-mildew." The Peaches become arrested in patches, never ripening where the fungus is located. Sprinkling with sulphur is the best remedy.

*Decayed Roses.*—Mr. Kelly, Greenwell Ford, Durham, forwarded shoots split and decayed. The appearance suggested their being cracked by frost and subsequently attacked by fungi.

*Synanthic Nymphaea.*—Mr. Hudson sent a specimen of twin flowers, united, of the lavender-coloured *Nymphaea stellata* from South Africa.

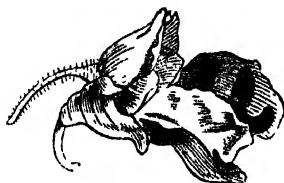
*Stanleya pinnatifida.*—Flowering sprays of this crucifer were sent by Mr. Bunyard. It is remarkable for the long spreading filaments and yellow sepals. It is a native of California, and figured in Gray's "Gen. Flor. Amer. Bor.," pl. 65.

*Figs dropping.*—Dr. Russell brought some Figs grown against a wall at Ringwood, Cornwall, which turned yellow, became shrivelled, and fell just before ripening. There was no fungus, but it was apparently due to want of water or nourishment, or possibly to insufficient fertilisation. They were sent to Mr. Wright for examination, who reports as follows:

"There are several causes that will affect Figs like the examples just to hand, such as too much or too little water, insufficient atmospheric moisture, and sudden checks in the atmosphere, also over-cropping. Any one of these will cause the fruit to drop prematurely. No fruit requires so much care and attention as the Fig."

*Pears decayed.*—Dr. W. G. Smith sent the following report on Pears received from the Rev. H. W. Fletcher, Bicker Vicarage, Boston:—

"The Pears received were quite dried up and full of mycelium: they had assumed the mummified condition which follows attacks by *Monilia fructigena*, the brown fruit-rot of Apple, Pear, Peach, and other rosaceous fruits. Cultures in a moist chamber produced several forms of fungi, including the form of spores known as *Monilia*. There were some insect larvæ in one of the fruits. Your correspondent mentions that the check began during a south-east wind, and also that the very early varieties escaped attack. In view of this it may be safest to assume that the crop received a check by this wind, and that the fruit was thus rendered susceptible to attack by fungi, &c., the *Monilia* form producing the mummified condition of the fruits received. The earlier sorts escaped because the fruit was further advanced and more resistant. All the dried fruits left hanging on the tree should be gathered and burnt."



**FRUIT AND VEGETABLE COMMITTEE.**

JANUARY 9, 1900.

PHILIP CROWLEY, Esq., in the Chair, and fourteen members present.

**Awards Recommended :—***Award of Merit.*

To Pear 'Doyenné d'Alençon' (votes, unanimous), from Roger Leigh, Esq., Barham Court, Maidstone (gr. Mr. G. Woodward). Fruit of medium size, bluntly pyriform; eye small and half open, set in a small depression; stalk half an inch long, thick, and placed in a shallow cavity; skin greenish yellow, covered with small brown spots; flesh tender, melting, and of very good flavour.

*Cultural Commendation.*

To Mr. G. Woodward, gardener to Roger Leigh, Esq., for splendid fruits of Pear 'Passe Crassane.'

FRUIT AND VEGETABLE COMMITTEE, JANUARY 23, 1900.

GEORGE BUNYARD, Esq., V.M.H., in the Chair, and fifteen members present.

**Awards Recommended :—***Award of Merit.*

To Apple 'Norman Pippin' (votes, 7 for, 3 against), from Messrs. Bunyard, Maidstone. Fruit of medium size, deep, round; skin greenish yellow, spotted with russety dots; eye nearly closed in a deep cavity; stalk thin, one inch long, and deeply inserted; flesh white, soft, and of good flavour for dessert.

To Apple 'Hormead Pearmain' (votes, unanimous), from Messrs. Bunyard. Fruit of medium size, deep, round, and handsome form; skin greenish yellow; eye half open, set in a wide shallow basin; stalk short and thick, not deeply inserted; flesh firm, juicy, and somewhat acid. A well known hardy free-bearing variety occasionally known as 'Hormead Pippin.' (Fig. 44.)

**Other Exhibits.**

Messrs. Bunyard sent twelve varieties of Apples, most of which were new.

Messrs. Voitch, Chelsea, sent Apple 'Royal Cooking.'

Messrs. Sutton, Reading, sent three large trays of Tomato 'Winter Beauty.'

The Marquis of Abergavenny, Neville Court, Abergavenny (gr. Mr. J. Chinnery), sent Apple 'Welsh Beauty.'

Mr. R. B. Davis, Yeovil, sent six local varieties of Apples.

Mr. Morris, Sandhurst, Berks, exhibited dried fruits of 'Victoria' Plums and of Quinces. Mr. Morris stated that such fruit could be dried in England by his process and sold wholesale at  $8\frac{1}{2}d.$  per lb., but to make any profit at these prices the manufacturer must be able to purchase fruit from the grower at  $1d.$  per lb.

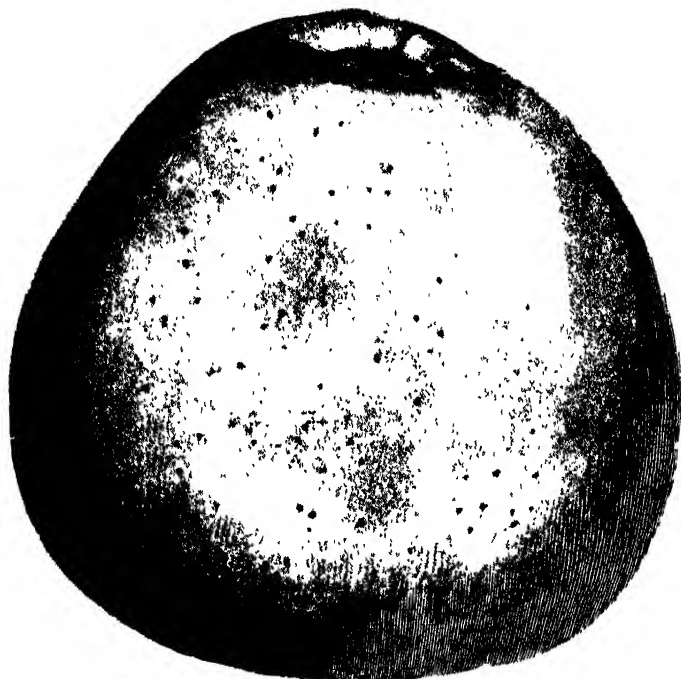


FIG. 44. —APPLE 'HORMEAD'S PEARMAIN.' (*Journal of Horticulture*.)

A. H. Pearson, Esq., proposed, and H. Balderson, Esq., seconded, that a vote of condolence be sent to the family of R. D. Blackmore, Esq., who died January 20, 1900. Mr. Blackmore was a highly esteemed member of the Fruit Committee for many years, and the vote was carried unanimously.

#### FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 13, 1900.

PHILIP CROWLEY, Esq., in the Chair, and seventeen members present.

#### Awards Recommended :—

*Silver-gilt Knightian Medal.*

To Mr. J. Watkins, Pomona Farm, Withington, Hereford, for 100 dishes of Apples.

To Messrs. Bunyard, Maidstone, for 100 dishes of Apples.

*Silver Knightian Medal.*

To W. Poupart, Esq., Marsh Farm, Twickenham, for forced Rhubarb, Seakale, and Asparagus.

*Award of Merit.*

To Rhubarb 'Daw's Champion' 'Victoria' × 'Champagne' (votes, 11 for), from W. Poupart, Esq. Stalks 2 ft. long, thick, and of a beautiful red colour.

*Cultural Commendation.*

To Mr. J. Fitt, gr. to F. W. Campion, Esq., Reigate, for Asparagus 'Sutton's Perfection' and 'Connover's Colossal.'

**Other Exhibits.**

Geo. Holmes, Esq., Acomb, York, sent Apple 'Nancy Jackson,' a well-known and popular variety in the North.

Messrs. Lane, Berkhamstead, sent Apple 'Red Blenheim,' said to be a highly coloured sport from 'Blenheim Orange.'

Messrs. Veitch, Chelsea, sent Apple 'McIndoe's Russet.'

Mr. J. Watkins sent Apples 'Tillington Seedling' and 'Foreman's Seedling.'

Mr. W. Camm, gr. to the Duchess of Cleveland, Battle, Sussex, sent some Apples named 'Sturmer Pippin.' The Committee considered them to be 'Lord Burghley.'

Mr. W. R. Bull, Ramsden, Essex, sent a seedling Apple named 'Aurora.'

Philip Crowley, Esq., Waddon House, Croydon, sent a pot of Quince jam of excellent flavour.

## FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 27, 1900.

PHILIP CROWLEY, Esq., in the Chair, and nineteen members present.

**Awards Recommended:—***Silver Banksian Medal.*

To C. P. Sercold, Esq., Maidenhead (gr. Mr. R. Bullock), for twenty-three dishes of Apples.

*Award of Merit.*

To Apple 'Gabalva,' from Mr. A. Pettigrew, gr. to the Marquis of Bute, Cardiff Castle. Fruit rather large, flattish; eye half closed, set in a moderately shallow basin; stalk short and deeply inserted; skin yellow, flushed with red and streaked on the exposed side, covered with minute dots of russet; flesh firm, crisp, and of good flavour, very similar to that of Blenheim Orange. The fruit was from a very old tree growing in an orchard on the Cardiff Castle estate. (Fig. 45.)

*Cultural Commendation.*

To Mr. Geo. Wythes, V.M.H., gr. to the Duke of Northumberland, Syon House, for fine fruiting growths of *Vanilla planifolia*.

To Mr. E. Beckett, gr. to Lord Aldenham, Elstree, for large well-grown Parsnips.

To Mr. J. Hudson, V.M.H., gr. to Leopold de Rothschild, Esq., Gunnersbury House, for immense fruits of *Carica Papaya*, grown on plants ten feet high. It is stated that tough meat rubbed with the juice of the fruit, or wrapped in the leaves, becomes very tender, but quickly goes putrid afterwards. In appearance the fruit resembles a thick ridge Cucumber: the flesh is orange-yellow and insipid in flavour.

### Other Exhibits.

Mr. J. Watkins, Withington, Hereford, sent Apple 'Lord Beacons-

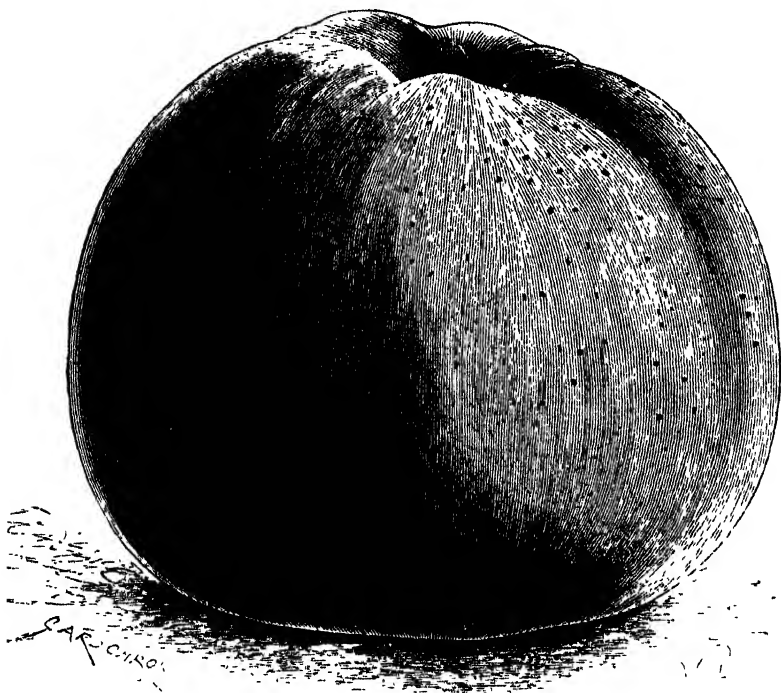


FIG. 15. APPLE 'GABALVA.' (*Gardeners' Chronicle*)

field,' a large highly coloured fruit of perfect form, but the specimens were somewhat past their best.

Col. H. M. Ridley, Wincanton, Somerset (gr. Mr. L. G. Read), sent Apple 'Ords Apple.'

Mr. J. S. Gilbert, Bourne, Lincs., sent two dishes of Apples and three dishes of Pears.

Mr. J. Crook, Ford Abbey Gardens, Chard, sent six dishes of Apples.

FRUIT AND VEGETABLE COMMITTEE, MARCH 13, 1900.

PHILIP CROWLEY, Esq., in the Chair, and twenty-seven members present.

### Awards Recommended :—

*Cultural Commendation.*

To Mr. R. Parker, gr. to the Duke of Richmond and Gordon, Good-

wood, for a beautiful dish of Apple 'Dumelows Seedling,' syn. 'Wellington.'

### Other Exhibits.

Mr. H. Becker, Jersey, sent Apple 'Winter Cheer,' almost identical with Baumann's 'Red Winter Reinette.'

E. A. Lee, Esq., Fowley, Liphook (gr. Mr. Hagon), sent Apple 'Hagon's Seedling,' very similar to 'Bess Pool.'

King's Acre Nursery Company, Hereford, sent Apple 'King's Acre Pippin.'

J. Fellowes, Esq., Kingston House, Dorchester (gr. Mr. B. Campbell), sent Apples 'Shepherd's Fame,' very similar to 'Kentish Fillbasket,' and 'Bockhampton Scarlet,' closely resembling 'Beauty of Kent.'

Mr. J. Crook, Forde Abbey Gardens, Chard, sent three varieties of Radish.

Mr. R. Parker, Goodwood, sent Apples 'Goodwood Pippin,' 'Marketing,' and 'Kitchen Keeper,' the last named being synonymous with 'Warcham Russet.'

Captain Carstairs, Welford Park, Newbury (gr. Mr. C. Ross), sent Apple 'White Nonpareil.' Fruit small, round; skin a whitish yellow; eye closed in a slight depression; stalk very long, in a deep depression. A very good dessert Apple for the time of the year, but the tree requires a warm position.

### FRUIT AND VEGETABLE COMMITTEE, MARCH 27, 1900.

PHILIP CROWLEY, Esq., in the Chair, and eighteen members present.

### Awards Recommended:—

#### *First-class Certificate.*

To Rhubarb 'Daw's Champion' (votes, unanimous), from W. Poupard, Esq., Marsh Farm, Twickenham. This variety was exhibited with four other varieties for comparison, all grown under exactly similar conditions in the open air, but 'Daw's Champion' proved to be not only the earliest, but also had the largest stalks, was of the finest colour, and of the best flavour when cooked.

#### *Award of Merit.*

To Apple 'King of Tompkins County' (votes, unanimous), from Mr. R. Parker, gr. to the Duke of Richmond and Gordon, Goodwood. Fruit rather large, three inches high, and the same in width; eye closed in a deep angular basin surrounded with ridges; stalk thick, short, and set in a deep cavity; skin pale yellow, streaked with red on the exposed side; flesh white, soft, juicy, and of good flavour. An American variety that succeeds very well in this country in warm situations.

### Other Exhibits.

Mr. R. Parker also sent nine varieties of Apples to show their keeping qualities.

Mr. C. Springham, Big-Snap, Llandago-on-Wye, Chepstow, sent Apple 'General Bett.'

FRUIT AND VEGETABLE COMMITTEE, APRIL 10, 1900.

PHILIP CROWLEY, Esq., in the Chair, and eighteen members present.

**Awards Recommended :—**

*Silver Knightian Medal.*

To Messrs. Cheal, Crawley, for sixty dishes of Apples.

*Cultural Commendation.*

To Mr. J. May, gr. to J. B. Joel, Esq., Potters Bar, for beautifully grown tubers of Potato 'Syon House Prolific.'

To Mr. G. Wythes, V.M.H., gr. to the Duke of Northumberland, Syon House, for large well-coloured fruits of Strawberry 'Royal Sovereign.'

**Other Exhibits.**

Messrs. J. Jakson, 17 Philpot Lane, E.C., sent a large barrel pierced with 100 holes on the sides, and mounted on an iron frame, on and by which it can be revolved. The sender recommended it for the cultivation of Strawberries, Tomatos, &c.

The Committee thought it might prove interesting to amateurs, but did not consider it to be of much practical value.

Messrs. Laxton, Bedford, sent a pretty Apple, locally known as 'Dessin de Bauf.'

Mr. D. Hazelwood, Partington Gardens, Leeds, sent a brace of handsome Cucumbers, which were considered to be of the variety 'Matchless.'

Messrs. Cheal, Crawley, sent Apples 'Atalanta' and 'Ottershaw Pippin.'

FRUIT AND VEGETABLE COMMITTEE, APRIL 24, 1900.

PHILIP CROWLEY, Esq., in the Chair, and twenty-one members present.

**Awards Recommended :—**

*Cultural Commendation.*

To Mr. J. Downs, gr. to J. T. Bennett-Poe, Esq., Holmwoods, Cheshunt, for a beautiful dish of Lemons.

To Messrs. Hammond & Johnstone, Brentwood, for very large highly coloured fruits of Strawberry 'Royal Sovereign.'

**Other Exhibits.**

Mr. R. C. Notcutt, Woodbridge, sent a dish of stewing Pear 'Winter Orange.'

The Director, Royal Gardens, Kew, sent two immense fruits of *Citrus medica*, var. 'Limonum.'

Lord Enfield, Wrotham Park, Barnet (gr. Mr. H. Markham), sent a Cucumber named 'Markham.'

## FRUIT AND VEGETABLE COMMITTEE, MAY 8, 1900.

• PHILIP CROWLEY, Esq., in the Chair, and twenty-one members present.

### Awards Recommended :—

*Silver-gilt Knightian Medal.*

To the Duke of Northumberland, Syon House (gr. Mr. G. Wythes, V.M.H.), for a collection of vegetables.

*Silver Knightian Medal.*

To the Earl of Camperdown, Shipton-on-Stour (gr. Mr. J. Masterson), for a collection of fruit.

To the Marquis of Salisbury, Hatfield (gr. Mr. G. Norman), for splendid 'Royal Sovereign' Strawberries.

*Award of Merit.*

To Cucumber 'Ideal' (votes, 8 for, 4 against), from Lord Aldenham, Elstree (gr. Mr. E. Beckett). This variety was raised from Lockie's 'Perfection' × 'Victory,' and is of medium size, with scarcely any neck, dark spines, and of fine colour.

To Turnip 'Early Forcing,' as a forcing variety (votes, 15 for), from Lord Aldenham. A very fine selection of 'Jersey Navet.'

*Cultural Commendation.*

To Mr. J. H. Cuckney, Cobham Hall Gardens, Gravesend, for fine fruits of 'Royal Sovereign' Strawberries.

### Other Exhibits.

Mr. G. Wythes, Syon House Gardens, sent Cabbage 'Early April,' very similar to Ellam's 'Early Dwarf.' It was requested that seed be sent to Chiswick for trial.

Mr. C. Martin, Clarence House Gardens, Isle of Wight, sent Melon 'Clarence House Favourite,' a pretty well-netted fruit, with scarlet flesh and of fair flavour.

Dr. R. Sisley, 1 Park Row, S.W., sent a small collection of Apples.

Messrs. Laxton Bros., Bedford, sent a new Perpetual Strawberry in pots named 'St. Antoine de Padoux.' Fruit of moderate size, of a bright red colour, with prominent seeds, and rather small foliage. The Committee wished to see it again later to enable them to judge of its value as a *perpetual* fruiting variety. The Rev. W. Wilks stated that on his light soil none of the Perpetual fruiting varieties were perpetual. They fruited at the usual season, and again in the late autumn, but too late to ripen out of doors. They also behave in a similar manner at Chiswick. Mr. G. Bunyard and Mr. J. Cheal stated that on their strong soil they fruited continuously until checked by frost. It would be interesting to know whether those who succeed with these so-called Perpetuals allow the plants to grow *quite* naturally like other outdoor Strawberries, or whether they in any way prevent them bearing a natural crop of fruit at the ordinary time of year, and in that way induce an autumnal fruiting. It would also be interesting if some one on "holding" soil would pinch out

all the bloom spikes from some plants of any of the ordinary varieties of Strawberries, and see if it induces an autumnal or late crop. It is well known that plants which have been forced early and borne a good crop of Strawberries, if allowed a fortnight's rest, and then turned out of their pots into good soil, and kept moist at the root in the hot July weather, will bear another good crop towards the end of August.

Mr. M. Gleeson, Warren House Gardens, Stanmore, sent bottles of Serum Fluid, for the destruction of mildew and rust on plants. It was sent to Chiswick for trial.

#### INNER TEMPLE GARDENS.

FRUIT AND VEGETABLE COMMITTEE, MAY 23, 1900.

PHILIP CROWLEY, Esq., in the Chair, and twenty-six members present.

#### Awards Recommended :—

The list of Cups and Medals awarded by the Council will be found on page xvi.

##### *Award of Merit.*

To Melon 'Buscot Park Hero' (votes, 12 for, 10 against), from A. Henderson, Esq., M.P., Buscot Park, Faringdon (gr. Mr. W. L. Bastin). Fruit round, yellow, heavily netted; flesh white, and of a sweet melting flavour. A hybrid from 'Imperial Green' × 'Hero of Lockinge.'

#### Other Exhibits.

Messrs. Rivers, Sawbridgeworth, sent Peach 'Duke of York,' a hybrid from 'Early Rivers' Nectarine ♀ × 'Alexander' Peach ♂. It is said to be as early as 'Alexander,' which it resembles in appearance, but is certainly of superior flavour.

Messrs. Rivers sent Peach 'Duchess of York' from 'Early Rivers' Nectarine ♀ × 'Early Rivers' Peach ♂. The tree is said to be a free bearer, and the fruit not prone to split at the stone like its pollen parent. A handsome variety of good flavour which the Committee wished to see again.

Messrs. Rivers also sent Peach 'Prince Edward' from 'Early Rivers' Nectarine ♀ × 'Hales Early' Peach ♂. This variety ripens immediately after the last named. All the three are said to have the colour, size, and early maturity of the American Peaches and the good constitution and free-bearing qualities of the seed parent.

W. H. Apthorpe, Esq., 94 Hills Road, Cambridge, sent two varieties of Cucumbers.

FRUIT AND VEGETABLE COMMITTEE, JUNE 5, 1900.

PHILIP CROWLEY, Esq., in the Chair, and fourteen members present.

#### Awards Recommended :—

##### *Silver-gilt Knightian Medal.*

To Messrs. Sutton, Reading, for a large collection of vegetables.

To Messrs. Rivers, Sawbridgeworth, for very fine 'Early Rivers' and 'Cardinal' Nectarines.

*Silver Knightian Medal.*

To Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. J. Hudson, V.M.H.), for highly coloured 'Early Rivers,' 'Cardinal,' and 'Lord Napier' Nectarines.

*Silver Banksian Medal.*

To Messrs. Laxton, Bedford, for a collection of Strawberries.

To Lord Aldenham, Elstree (gr. Mr. E. Beckett), for large and superbly coloured 'Lord Napier' Nectarines.

*Award of Merit.*

To Strawberry 'Trafalgar' (votes, 10 for, 1 against), from Messrs.

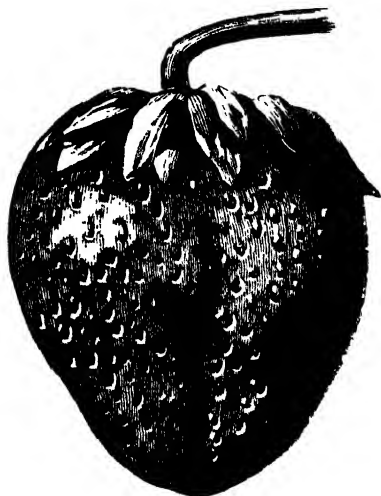


FIG. 16.—STRAWBERRY 'TRAFALGAR.' (*Journal of Horticulture*.)

Laxton, Bedford. Fruit large, wedge shape, pale red with prominent reddish seeds; flesh white and of a refreshing flavour. (Fig. 46.)

### Other Exhibits.

Messrs. Laxton sent Strawberry 'Climax' (Latest of All  $\times$  Waterloo), a large pale red, wedge-shaped fruit, with prominent yellow seeds; flesh pale red, sweet, and with a distinct 'President' flavour.

Messrs. Sutton sent Cucumber 'Lord Roberts' from 'Telegraph'  $\times$  'Sutton's Prizewinner,' a dark-spined variety, said to be very free-bearing.

FRUIT AND VEGETABLE COMMITTEE, JUNE 19, 1900.

GEO. BUNYARD, Esq., V.M.H., in the Chair, and eighteen members present.

### Awards Recommended :—

*Silver-gilt Knightian Medal.*

To Lord Wantage, K.C.B., V.C., Lockinge Park, Wantage (gr. Mr. W. Pyfe), for an excellent collection of fruit.

*Silver Knightian Medal.*

To Lord Gerard, Eastwell Park, Ashford, Kent (gr. Mr. H. Walters), for a collection of Melons.

*Silver Banksian Medal.*

To C. E. Strachan, Esq., Gaddesden Place, Hemel Hempstead (gr. Mr. H. Folkes), for a collection of Peaches and Melons.

*Cultural Commendation.*

To Mr. J. Vert, gr. to Lord Braybrooke, Audley End, Saffron Walden, for large fruits of Strawberry 'Waterloo.'

**Other Exhibits.**

C. P. Serocold, Esq., Taplow Hill, Maidenhead (gr. Mr. R. Bullock), sent three dishes of dessert Apples.

Mr. Jas. Budd, Lockerley Hall Gardens, Romsey, sent three fruits of a Nectarine raised from seed of N. 'Lord Napier.' The fruit was of high colour and good flavour. The Committee considered it a very promising variety and wished to see six fruits later on.

Capt. Carstairs, Welford Park, Newbury (gr. Mr. C. Ross), sent Melon 'Baden-Powell,' from 'Hero of Lockinge' × 'Banquet,' the latter a scarlet-fleshed American variety. The fruit was large, round, yellowish, and well netted; deep; scarlet flesh, but somewhat lacking in flavour.

Duke of Northumberland, Syon House (gr. Mr. G. Wythes, V.M.H.), sent Melon 'Victory,' from 'Syon House' × 'Victory of Bath.' Fruit greenish, oval, sparsely netted; flesh scarlet, but wanting in flavour.

Messrs. Jakson, 17 Philpot Lane, E.C., sent a revolving barrel planted with Strawberries on the top and round the sides in holes made in the barrel.

F. W. Campion, Esq., Colley Manor, Reigate (gr. Mr. Pitt), sent Strawberry 'Royal Sovereign,' grown in a cold frame.

Lord Gerard (gr. Mr. H. Walters) sent Melon 'Eastwell Park,' from 'British Queen' × 'Countess.' Fruit large, round, pale yellow, and heavily netted; flesh white and of good flavour. The Committee wished to see this promising variety again a little riper.

R. J. C. Mitchell, Esq., Moreton Court, Hereford (gr. Mr. G. Smith), sent an unripe Melon.

It was proposed, seconded, and carried unanimously by the Committee that the Council be requested to enact that in future all collections of fruit should be decorated with foliage alone, and that no flowers should be used, as they detract from the beauty of the fruit.

FRUIT AND VEGETABLE COMMITTEE AT RICHMOND, JUNE 27, 1900.

H. BALDERSON, Esq., in the Chair, and twenty members present.

**Awards Recommended:—**

*Hogg Medal.*

To Lord Aldenham, Aldenham House, Elstree (gr. Mr. E. Beckett), for a magnificent collection of vegetables.

*Silver Knightian Medal.*

To Messrs. Sutton, Reading, for a collection of Tomatos in pots.

• *Silver Banksian Medal.*

To Lord Gerard, Eastwell Park, Ashford (gr. Mr. H. Walters), for a collection of Melons.

**Other Exhibits.**

Mr. E. Beckett, gr. to Lord Aldenham, sent a box of Cucumber 'Ideal.'

Messrs. Sutton sent eleven varieties of Tomatos, one of which, named 'Sunbeam,' was considered by the Committee to be very promising. It was requested that seed be sent to Chiswick for trial with other varieties.

R. J. C. Mitchell, Esq., Moreton Court, Hereford (gr. Mr. G. Smith), sent a Melon.

Mr. H. Walters, gr. to Lord Gerard, sent Melon 'Eastwell Park.'

W. Poupart, Esq., Marsh Farm, Twickenham, sent a small collection of vegetables.

## FRUIT AND VEGETABLE COMMITTEE AT CHISWICK, JUNE 28, 1900.

W. MARSHALL, Esq., in the Chair, and twelve members present.

The Committee inspected ten varieties of Peas and eight varieties of Lettuce.

**Awards Recommended:—***Award of Merit.*

To Pea 'Monarch' (votes, unanimous), from Messrs. Sharpe, Sleaford.

To Pea 'The Major' (votes, unanimous), from Mr. E. R. Webber, St. Catherine's Hill Gardens, Worcester.

To Pea 'Edwin Beckett' (votes, unanimous), from Mr. E. Beckett, Aldenham House Gardens, Elstree. (Fig. 47.)

To Lettuce 'Improved All the Year Round' (votes, unanimous), from Messrs. Harrison, Leicester.

## FRUIT AND VEGETABLE COMMITTEE, JULY 3, 1900.

H. BALDERSON, Esq., in the Chair, and twenty members present.

**Awards Recommended:--***Silver-gilt Knightian Medal.*

To Lord Llangattock, The Hendre, Monmouth (gr. Mr. T. Coomber), for fourteen large highly coloured 'Queen' Pineapples.

*Silver Knightian Medal.*

To Leopold de Rothschild, Esq., Gunnersbury Park, Acton, W. (gr. Mr. G. Reynolds), for a collection of Cherries and Strawberries.

To Miss Adamson, South Villa; Regent's Park, N.W. (gr. Mr. G. Kelf), for a collection of Peaches.

*Silver Banksian Medal.*

To C. Bayer, Esq., Tewkesbury Lodge, Forest Hill (gr. Mr. W. Taylor), for a collection of Peaches and Nectarines.

To Messrs. Rivers, Sawbridgeworth, for a collection of Peaches, Nectarines, Cherries, and Plums.

*First-class Certificate.*

To Pea 'Edwin Beckett' (votes, 11 for), from Mr. E. Beckett, Alden-

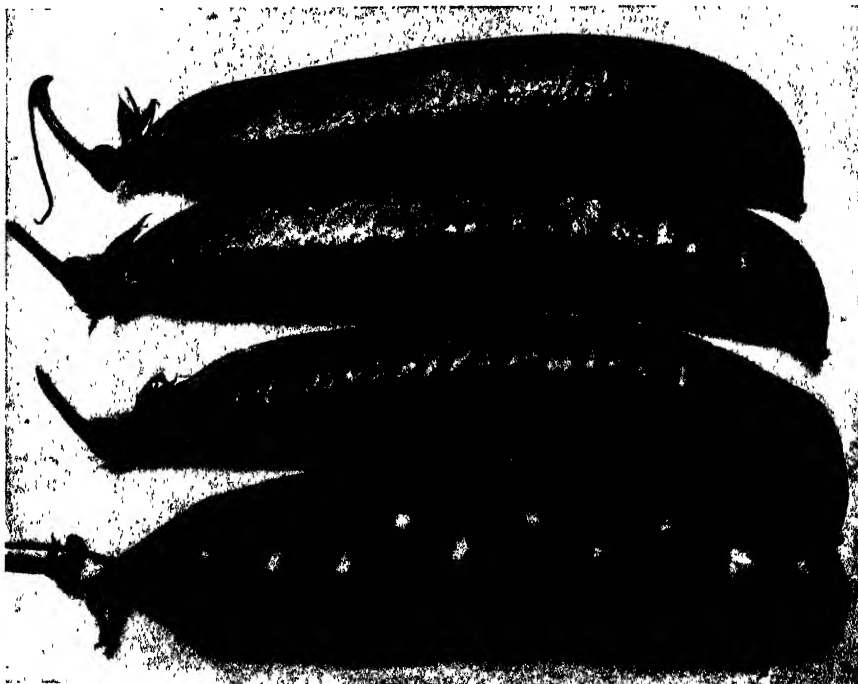


FIG. 47.-PEA 'EDWIN BECKETT.' (*The Garden.*)

ham House Gardens, Elstree. This variety was recommended an Award of Merit at Chiswick on June 28. (Fig. 47.)

*Award of Merit.*

To Melon 'Free Chase Scarlet' (votes, unanimous), from Mr. W. Meade, gr. to Sir George Allen, Free Chase, Hayward's Heath. Fruit of very large size, beautifully notted; round, yellow skin; flesh red and very thick, and of good flavour. A hybrid from 'Hero of Lockinge'  $\times$  'Imperial Green.'

To Nectarine 'Lockerley Hall' (votes, 10 for, 3 against), from Mr. James Budd, Lockerley Hall Gardens, Romsey, Hants. A seedling from 'Lord Napier.' The fruit is somewhat similar to the parent in size and

colour, but, whilst of equal flavour, it is said to be three weeks earlier when growing under similar conditions.

*Cultural Commendation.*

To Mr. J. Hudson, V.M.H., gr. to Leopold de Rothschild, Esq., Gunnersbury House, Acton, W., for very fine highly coloured fruits of Cherry 'Bigarreau de Schrecken,' 42 fruits weighing 1 lb. from a tree on an open wall.

**Other Exhibits.**

Mr. M. Jones, The Gardens, Undermount, Bonchurch, Isle of Wight, sent Melon 'Hero of Bonchurch,' from 'Hero of Lockinge' × 'Sutton's A 1.' Fruit of medium size, oval, yellow, and slightly netted; flesh green and of good flavour. The Committee desired to see it again.

Mr. C. W. Wright, The Châtelet, Horley, Surrey, sent Tomato, identical with 'Red Peach.'

Mr. Bound, gr. to J. Colman, Esq., Gatton Park, Reigate, sent Melon 'Gatton Park.' Fruit round; yellow skin, beautifully netted, very handsome; flesh white, but of only fair flavour. From 'Hero of Lockinge' × 'La Favorite.'

Mr. R. Steward, gr. to J. B. Gupp, Esq., Dunefield, Walton-on-Thames, sent a Pea from 'Veitch's Perfection' × 'William I.' The Committee wished it to be sent to Chiswick for trial. Mr. Steward also sent a Strawberry from 'Waterloo' × 'Garibaldi.' The fruit was small and rather acid.

Messrs. Laxton, Bedford, sent Strawberry 'Fillbasket.' A prolific variety with rather small fruits of the British Queen type, and a somewhat acid flavour.

Messrs. Veitch, Chelsea, staged two boxes of Strawberry 'Veitch's Prolific,' one grown on light soil and one on heavy soil; the fruits grown on the heavy soil were much the best in quality. Messrs. Veitch also sent haulm and pods of Pea 'Acme.'

Messrs. Carter, High Holborn, W.C., sent Melon 'Golden Orange.' A long oval fruit with a yellow skin and white flesh, of fair flavour.

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FRUIT AND VEGETABLE COMMITTEE AT CHISWICK, JULY 10, 1900.

H. BALDERSON, Esq., in the Chair, and thirteen members present.

The Committee examined fifteen stocks of early Potatoes, of which ten were so good in cropping and appearance that the Committee ordered some of each to be cooked, viz.—

Earliest of All  
Round Seedling  
Ringleader  
Ninetyfold  
Early Perfection

Pioneer Earliest Kidney  
Grimston Ashleaf No. 2  
May Queen  
Harbinger  
Denbigh Castle

(See Aug. 14)

**Awards Recommended :—**

*First-class Certificate.*

To Potato 'Denbigh Castle' (votes, unanimous), from tubers sent by Messrs. Sharpe, Sleaford.

*Award of Merit.*

To Potato 'Ringleader' (votes, unanimous), grown from tubers sent by Messrs. Sutton, Reading.

To Potato 'Ninetyfold' (votes, unanimous), grown from tubers sent by Messrs. Sutton.

The Committee then examined several stocks of Lettuce.

*Highly Commended.*

Lettuce 'Harrison's Emerald' (votes, unanimous), from seed sent by Messrs. Harrison, Leicester.

Lettuce 'Harrison's King' (votes, 6 for, 3 against), from seed sent by Messrs. Harrison.

The Committee afterwards inspected thirty stocks of Peas.

*First-class Certificate.*

To Pea 'Alderman' (votes, unanimous), from seed sent by Messrs. Barr, Covent Garden, W.C.

*Award of Merit.*

To Pea 'Late Queen' (votes, unanimous), from seed sent by Messrs. Barr.

To Pea 'Peerless' (votes, unanimous), from seed sent by Messrs. Barr.

To Pea 'Standard' (votes, unanimous), from seed sent by Messrs. Sharpe, Sleaford.

To Pea 'Fascination' (votes, unanimous), from seed sent by Messrs. Harrison, Leicester.

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FRUIT AND VEGETABLE COMMITTEE, JULY 17, 1900.

GEO. BUNYARD, Esq., V.M.H., in the Chair, and fourteen members present.

**Awards Recommended.**

*Silver-gilt Knightian Medal.*

To Messrs. Johnson, Boston, Lincs., for 150 dishes of Peas.

*Silver Knightian Medal.*

To Mr. S. Le Pelley, The Vineries, Rusper, for twelve handsome bunches of black Hamburgh Grapes.

To Messrs. Cheal, Crawley, for a group of standard Gooseberry and Currant trees.

*Silver Banksian Medal.*

To Messrs. Carter, High Holborn, for forty varieties of Lettuces.

To the Marquis of Salisbury, Hatfield House, Hatfield (gr. Mr. G. Norman), for a tray of magnificent 'Brown Turkey' Figs.

### Other Exhibits.

Messrs. Cross, Daffodil Nursery, Wisbech, sent Apple 'Early Victoria.'

Mr. G. Charlton, High Church, Morpeth, staged fruiting branches of Gooseberry 'Victoria,' stated to be a stronger grower than 'Winham's Industry,' paler in colour and of superior cropping powers and of finer flavour. The Committee desired to see ripe fruit later on.

Mr. W. A. Clarke, Inglewood Gardens, Hungerford, sent a yellow Tomato, which the Committee considered to be 'Golden Queen.'

H. C. Fry, Esq., Bickley Hall, Kent (gr. Mr. E. Dove), sent Melon 'Bickley Hall Hero,' from 'Blenheim Orange' × 'Hero of Lockinge.' A large fruit, but much over-ripe.

R. J. Gifford Read, Esq., Cadbyrie House, Ealing, sent a good dish of Apple 'Old Stone Pippin;' an excellent late keeping West of England dessert Apple.

Lord Suffield, Gunton Park, Norwich (gr. Mr. W. Allan), sent three beautiful dishes of Strawberry 'Lady Suffield.'

Messrs. J. Veitch, Chelsea, sent Strawberry 'Lord Kitchener,' in admirable condition for so late in the season. Also Raspberry 'Yellow Superlative,' from 'Superlative' × 'Autumn Yellow.' The wood and foliage are exactly similar to 'Superlative,' and the bright yellow fruit is freely produced in large clusters.

The Duke of Northumberland, Syon House (gr. Mr. G. Wythes, V.M.H.), sent a handsome Melon from 'Beauty of Syon' × 'Hero of Lockinge.'

Rev. W. Wilks, M.A., Shirley Vicarage, Croydon, staged a basket of the Loganberry fruit, of large size. Mr. Wilks informed the Committee that the plant was growing in a very dry position, yet was making excellent growth and fruiting profusely. The fruit is scarcely suitable for dessert on account of its acidity, but is very good indeed for cooking and bottling purposes. The Loganberry is the result of a cross effected by Judge Logan in the United States between a Blackberry and a Raspberry. The growth and foliage of the plant are exactly like a Blackberry, but the fruit is in shape and flavour a Raspberry—a very large, very brisk-flavoured Raspberry—with the two exceptions that when quite ripe it is almost as dark as a Mulberry and the core or pith is not nearly so large as in a Raspberry, parts easily from the stalk, and comes off with the fruit as in a Blackberry.

### FRUIT AND VEGETABLE COMMITTEE, JULY 31, 1900.

PHILIP CROWLEY, Esq., in the Chair, and twenty members present.

### Awards Recommended:—

*Silver-gilt Knightian Medal.*

To Messrs. Veitch, Chelsea, for 100 dishes of Gooseberries and other fruit.

*Silver Knightian Medal.*

To Lord Gerard, Eastwell Park, Ashford (gr. Mr. H. Walters), for a collection of hothouse fruit.

*Cultural Commendation.*

To Mr. B. Ashton, gr. to the Earl of Lathom, Lathom House, Ormskirk, for very fine 'Royal George' Peaches.

**Other Exhibits.**

Lord Gerard sent Melon 'Eastwell Park,' of fair flavour.

Mrs. McIntosh, Havering Park, Romford (gr. Mr. C. Hodges), sent Melon 'Havering Park Hero,' which was much over-ripe.

Lord Derby, Knowsley, Prescot (gr. Mr. R. Doe), sent an enormous Melon 'Countess of Derby,' weighing 13½ lb. A round handsome fruit with white flesh of moderate flavour. Also a pretty unnamed oval Melon with scarlet flesh of good flavour.

Messrs. Cross, Wisbech, sent Apple 'Early Victoria.'

Messrs. R. Veitch, Exeter, sent fruiting branches of *Elæagnus multiflorus* (syn. *E. edulis* and *E. longipes*); also jam of the same, which was sweet, but rough on the palate, very like Tamarinds.

Messrs. Ray, Teyham, Kent, staged very fine fruit of Cherry 'Noble.'

H.M. The Queen, Windsor (gr. Mr. A. Thomas, V.M.H.), sent Melon 'Princess,' from 'Shamrock' ♀ × 'Sutton's Pink Flesh' ♂. A deep round well-netted golden fruit with scarlet flesh of good flavour. Also Tomato 'Waterloo,' from 'Dwarf Champion' ♀ × 'Frogmore Selected' ♂, which the Committee wished tried at Chiswick.

Messrs. Veitch, Chelsea, staged Strawberry 'The Khedive,' from 'Lord Suffield' × 'British Queen.' A pretty deep scarlet pointed fruit with a decided 'British Queen' flavour. It was requested to be sent to Chiswick for trial.

W. Roupell, Esq., Roupell Park, sent Apples 'Gladstone,' 'Red Astrachan,' and 'Joanetting.'

Rev. W. Wilks, M.A., Shirley Vicarage, Croydon, sent fruit of *Rubus leucodermis*. Fruit small, black, and sweet, freely produced on the plants, which are of upright growth like a Raspberry, but the canes are silvery white in the young state.

Rev. E. Darnley Smith, Landscope Vicarage, Ashburton, sent a sample of his new Sectional Fruit Protector. The Committee wished them to be tried at Chiswick.

FRUIT AND VEGETABLE COMMITTEE, CHISWICK, AUGUST 3, 1900.

H. BALDERSON, Esq., in the Chair, and four members present.

The Committee inspected forty-five stocks of early Potatoes, and selected nine to be cooked for their fine appearance and heavy crop, viz.—

Cigarette	Beauty of Hebron
Early Peter	Harbinger
May Queen	Pioneer Early Kidney
Sharpe's Victor	Sunbeam

Sir John Llewelyn

**Awards Recommended :—**

*Highly Commended.*

To Potato 'Pioneer Earliest Kidney' (votes, unanimous), from tubers sent by Messrs. Dickson, Chester.



FIG. 48.—*RUBUS PHOENICOLASIUS*, THE JAPAN WINEBERRY. (*Journal of Horticulture*.)

To Potato 'Beauty of Hebron' (votes, unanimous), from tubers sent by Messrs. J. Veitch, Chelsea.

The Committee then examined eight stocks of French Beans.

*Highly Commended.*

To French Bean 'Early Favourite' (votes, unanimous), from Messrs. J. Veitch, Chelsea.

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FRUIT AND VEGETABLE COMMITTEE, AUGUST 14, 1900.

PHILIP CROWLEY, Esq., in the Chair, and twenty members present.

**Awards Recommended :—**

*Silver-gilt Knightian Medal.*

To Miss Adamson, South Villa, Regent's Park (gr. Mr. G. Kelf), for a very fine collection of indoor fruit.

*Silver Knightian Medal.*

To Messrs. J. Veitch, Chelsea, for a collection of Gooseberries in pots, and fifty dishes of Apples, Pears, and Plums.

The Earl of Strafford, Wrotham Park, Barnet (gr. Mr. H. Markham), for twelve large and well-finished bunches of Black Hamburgh Grapes cut from a vine bearing sixty bunches and planted 115 years ago.

*Award of Merit.*

To Potato 'Pioneer,' Earliest Kidney, from Messrs. Dicksons Chester.

To Potato 'Beauty of Hebron,' from Messrs. J. Veitch, Chelsea.

To Potato 'Sharpe's Victor,' from Messrs. Sharpe, Sleaford, and Messrs. J. Veitch.

Each of the above Potatoes was highly commended at Chiswick on August 8. (Votes, in each instance, unanimous.)

To Damson 'Rivers's Early' (votes, unanimous), from the R.H.S. Gardens. Fruit small, perfectly round, with a very short stalk; deep blue-black colour, with green flesh of excellent flavour and like the Damson, though much larger. Tree a free bearer, growth upright, moderately strong, and having rather small downy foliage. This variety should prove valuable for private gardeners or market growers.

*Cultural Commendation.*

To Mr. G. Norman, gr. to the Marquis of Salisbury, Hatfield House, for exceptionally fine 'Royal George' Peaches.

To Mr. S. Woodward, gr. to R. Leigh, Esq., Barham Court, Maidstone, for Peaches 'Alexander;' and also for three dishes of large highly coloured Apples, viz., 'Bietigheimer Red' (syn. 'Red German'), 'Northern Dumpling,' and 'Williams's Favourite.'

**Other Exhibits.**

Messrs. J. Veitch sent Plum 'McLaughlin's Gage,' a handsome and delicious fruit, but the tree is said to be a shy bearer.

The Earl of Ilchester, Holland House, Kensington (gr. Mr. Dixon), sent Peach 'Violette Hative' and Nectarine 'Lord Napier.'

Mr. John Wood, Penrith, sent Dwarf Bean 'Wood's Centenary,'

which was considered to be synonymous with 'Golden Butter' and 'Dwarf Mont d'Or.'

Mr. J. Jones, Ridgway Vineries, Malvern, sent Tomato 'The National' ('Golden Perfection' × 'Challenger'). Fruit flattish, round, red, and splashed with yellow in a way that does not improve the appearance.

Mr. J. Walker, Fairy Field, Cobham, sent large fruits of a hybrid Tomato ('Shardelow' × 'Sutton's Perfection').

Mr. G. Charlton, High Church, Morpeth, sent Gooseberry 'Victoria.' A very large red berry, of somewhat acid flavour, but said to be a very great bearer.

Capt. Carstairs, Welford Park, Newbury (gr. Mr. C. Ross), showed Melon 'Baden-Powell.' A handsome yellow and heavily netted fruit with scarlet flesh, somewhat mealy, but of good flavour.

W. Roupell, Esq., Harvey Lodge, Roupell Park, S.W., sent several dishes of Dessert Apples.

Messrs. Cheal, Crawley, sent Bean 'Longpod of Leyden.' The pods were of immense length, of the Scarlet Runner type, but thin and lacking in flesh.

The Marquis of Salisbury (gr. Mr. Norman) sent Melon 'Hatfield Hybrid.'

#### FRUIT AND VEGETABLE COMMITTEE, AUGUST 16, 1900, AT CHISWICK.

PHILIP CROWLEY, Esq., in the Chair, and nine members present.

The Committee examined fifty-five stocks of early and second early, and forty-five stocks of midseason Potatoes: of these thirteen were so productive and good in appearance that the Committee ordered some of each to be cooked, viz.—

Collier's Glory	Kate Henderson
Duchess of York	Kruger's Master
Early Puritan	Sir John Llewelyn
General Roberts	Supreme
Grimston Ashleaf No. 1	Tommy Atkins
Grimston Ashleaf No. 2	Twentieth Century
Improved Ashleaf	

#### Awards Recommended :—

##### *Award of Merit.*

To Potato 'Collier's Glory' (votes, unanimous), from tubers sent by Mr. J. Compton, Little Eaton House Lodge, Duffield, Derbyshire.

To Potato 'Early Puritan' (votes, unanimous), from tubers sent by Messrs. J. Veitch, Chelsea.

#### FRUIT AND VEGETABLE COMMITTEE, AUGUST 28, 1900.

PHILIP CROWLEY, Esq., in the Chair, and eleven members present.

#### Awards Recommended :—

##### *Gold Medal.*

To the Duke of Wellington, Strathfieldsaye, Hants (gr. Mr. T. W.

McHattie), for a superb collection of fruit, the Grapes being exceptionally fine.

*Silver-gilt Knightian Medal.*

To Lord Wantage, Lockinge Park, Wantage (gr. Mr. W. Fyfe), for a collection of fruit.

*Silver Knightian Medal.*

To Messrs. Bunyard, Maidstone, for thirty baskets of fruit.

*Silver Banksian Medal.*

To Messrs. Laing, Forest Hill, S.E., for fruit trees in pots.

To Messrs. Spooner, Hounslow, for forty dishes of Apples.

*Award of Merit.*

To Strawberry 'St. Antoine de Padoue' (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain). Fruit of medium size, nearly round, bright scarlet, with prominent seeds, flesh firm and of good flavour. A perpetual fruiting variety raised from 'St. Joseph' × 'Royal Sovereign.' The plant is said to be a free bearer, and the best of the so-called perpetual-fruited class.

*Cultural Commendation.*

To Messrs. J. Veitch, Chelsea, for a group of Tomato 'Chiswick Peach,' grown in pots and bearing a large crop of fruit.

To Dr. Bonavia, Westwood, Worthing, for three varieties of Aubergines of large size, and when cooked of delicious flavour.

To Mr. G. Kelf, South Villa Gardens, Regent's Park, for a dish of Peach 'Malta,' of exquisite flavour.

**Other Exhibits.**

Messrs. J. Veitch sent Dwarf Bean 'Veitch's Hybrid,' from Scarlet Runner × Dwarf French.

Mr. J. Walker, Fairfield Gardens, Cobham, sent a Tomato.

Mr. J. Watkins, J.P., Pomona Farm, Hereford, sent Apple 'Hâtive de Crimea,' the stock of which had been received from Russia three years ago. Fruit rather small, conical; eye partly open, set in a shallow depression; stalk long and not deeply inserted; skin white and marked with russet; a distinct dessert variety of fair flavour. He also sent a very pretty Crab named 'August' or 'Gideon,' said to be an early American variety.

Messrs. Cross, Daffodil Nurseries, Wisbech, sent Apple 'Duke of York,' considered to be synonymous with 'Cat's Head.'

Mr. C. Terry, Papworth Gardens, Papworth, Everard, Cambs, sent a pretty seedling Apple, which the Committee wished to see again under a name.

Mr. C. Griffin, Walton Leigh Gardens, Addlestone, sent a seedling Apple.

Messrs. Turner, Slough, brought a fruiting tree and fine fruit of Rivers's Early Nectarine, grown in the open air.

Mr. F. G. Coates, Mendip Coombe, Maidenhead, sent Apple 'Coates's Seedling.'

Sir Trevor Lawrence, Bart., Burford, sent flowering and bearing sprays of 'Dolichos Lablab.' Almost like a Scarlet Runner Bean in foliage and pod, but with rosy-purple flowers. The pods and leaves are also heavily marked with purple.

Messrs. J. Veitch sent fruit of Nectarines 'Précoce de Croncels' and 'Early Rivers,' grown in the open air.

Mr. McHattie, Strathfieldsaye, sent a large Melon 'Lord Lothian' ('Little Heath' × 'Beechwood').

Mr. W. H. Tolhurst, Bolmore, Hayward's Heath, sent very curious fruits of the Australian Cucumber. They are a pale yellow colour, nearly round, with a cavity at the "nose," and about the size of an Orange. When cut through the seeds are in divisions or cells like the Tomato, and occupy nearly the whole centre of the fruit. In taste the flavour is exactly like the Ridge Cucumber. Mr. Tolhurst says that it is easily grown in a cold frame, and is remarkably prolific.

Messrs. Bunyard sent Pear 'Petite Marguerite,' a pretty pyriform fruit of fair quality.

#### FRUIT AND VEGETABLE COMMITTEE AT CHISWICK, AUGUST 30, 1900.

J. HUDSON, Esq., V.M.H., in the Chair, and seven members present.

The Committee examined sixty-five stocks of Potatos, of which eleven produced such good crops of fine appearance that the Committee ordered some of each to be cooked, viz.—

Baden-Powell	Gem
Beehive	Kerr's A.
Centenary	Kerr's B.
Duchess of Buccleuch	Sir John Llewelyn
Duchess of York	Superb
Supreme	

#### Awards Recommended:—

##### *Highly Commended.*

Potato 'Baden-Powell' (votes, unanimous), from tubers sent by E. W. Caddick, Esq., Caradoc, Ross, Herefordshire.

Potato 'Centenary' (votes, unanimous), from tubers sent by Messrs. Sutton, Reading.

Potato 'Sir John Llewelyn' (votes, unanimous), from tubers sent by Mr. J. Harris, Blackpill Nurseries, Swansea.

Potato 'Supreme' (votes, unanimous), from tubers sent by Messrs. Sutton.

The Committee then inspected eighty-one stocks of Tomatos grown both under glass and in the open air.

##### *Highly Commended.* (As outdoor varieties.)

Tomato 'Young's Eclipse,' from Messrs. Young, Stevenage.

Tomato 'Chemin Rouge,' from the R.H.S. Gardens.

Tomato 'The Comet,' from Messrs. Wrench, Suffolk Street, S.W., and Watkins & Simpson, Exeter Street, Strand.

Tomato 'Cherry Ripe,' from Messrs. Dobbie, Rothesay.

Tomato 'King's Seedling,' from Messrs. Newport, Hillingdon Heath.

Tomato 'Golden Nugget,' from Messrs. Sutton, Reading.

Tomato 'Frogmore Selected,' from Messrs. J. Veitch, Chelsea.

Tomato 'Golden Drop,' from Messrs. Dobbie, Rothesay.

*Highly Commended.* (As indoor and outdoor varieties.)

Tomato 'Tit Bits,' from Messrs. Watkins & Simpson, Exeter Street, Strand.

Tomato 'Veitch's Glory,' from Messrs. R. Veitch, Exeter.

Tomato 'Wonder of Italy,' from Mr. J. Tait, The Gardens, Lynehow, Carlisle.

Tomato 'Ravenscroft's Red,' from Mr. B. C. Ravenscroft, Laxey, Isle of Man.

Tomato 'Supreme,' from Mr. R. Holmes, King Street, Norwich.

Tomato 'The Cropper,' from Messrs. Cutbush, Highgate.

#### FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 11, 1900.

PHILIP CROWLEY, Esq., in the Chair, and nineteen members present.

#### **Awards Recommended :—**

*Silver Knightian Medal.*

To Messrs. James Veitch, Chelsea, for a collection of fruit.

*Silver Banksian Medal.*

To Mrs. Burns, North Myms Park, Hatfield (gr. Mr. C. R. Fielder), for a collection of Plums.

*First class Certificate.*

To Cabbage 'Cannell's Defiance' (votes, unanimous), from Messrs. Cannell, Swanley. Heads of medium size, firm, pale green, conical, and with a small spread of outer leaves. It is said to be equally useful for autumn or spring sowing.

*Award of Merit.*

To Filbert 'Early Prolific' (votes, unanimous), from Messrs. Bunyard, Maidstone. Nuts long, and covered with a pretty fringed husk; shell thin, and the kernel of good flavour. A free-bearing variety producing large clusters of nuts, and ripening three weeks earlier than other varieties.

To Potato 'Sir John Llewelyn' (votes, unanimous), from Mr. J. Harris, Blackpill Nurseries, Swansea.

To Potato 'Centenary' (votes, unanimous), from Messrs. Sutton, Reading.

To Potato 'Supreme' (votes, unanimous), from Messrs. Sutton.

To Potato 'Baden-Powell' (votes, unanimous), from E. W. Caddick, Esq., Caradoc, Ross (gr. Mr. M. Roe).

All four varieties of Potatoes had been highly commended at Chiswick on August 30, 1900.

To Apple 'St. Everard' (votes, unanimous), from Mr. C. Terry, Papworth Hall Gardens, Papworth Everard. Fruit rather below medium size, perfect form; eye prominent, open, with reflexed segments; stalk  $\frac{3}{4}$  inch long, thin, inserted in a shallow cavity; skin nearly covered with red, and spotted with pale spots; flesh crisp, tender, and of very good flavour.

*Cultural Commendation.*

To Messrs. Paul, Cheshunt, for a group of Strawberry 'St. Joseph.'

### Other Exhibits.

From the R.H.S. Gardens, Chiswick, came fourteen varieties of Tomatos, which had been highly commended August 30.

The Duke of Rutland, Belvoir Castle, Grantham (gr. Mr. W. H. Divers), sent fruit and jam of the 'Mirabelle' Plum, from trees brought by his Grace from Cronberg, Germany, in 1886. It is a small, sweet, pale-yellow Plum, and must not be confounded with the Cherry Plum (*Prunus myrobalana*), which is sometimes erroneously called the Mirabelle Plum. There are many forms of the true Mirabelle Plum, and the one from Belvoir Castle closely resembled the Plum called 'St. Etienne,' which has medium-sized, pale-yellow round fruits (occasionally faintly flushed or spotted with red), and small foliage, with kidney-shaped glands. Mr. Divers also sent a local Plum named 'Moor Park.'

Miss Lively, Hemel Hempstead, sent a seedling Plum.

H. Balderson, Esq., Corner Hall, Hemel Hempstead, sent six fruits of Melon 'Hero of Lockinge.'

Messrs. R. Veitch, Exeter, sent Tomato 'Veitch's Glory,' which was highly commended at Chiswick August 30.

Messrs. Harrison, Leicester, staged a collection of Dwarf and Runner Beans.

Messrs. Jas. Veitch, Chelsea, sent Damson 'John Seden,' from 'Black Orleans' Plum  $\times$  Farleigh Damson. Fruit round, blue-black in colour; stalk half an inch long; flesh green, and of fair flavour. Fruiting branches taken from trees raised from seed four years ago were bearing profusely.

Messrs. Bunyard, Maidstone, sent Apple 'Bielo Boradawka,' a Russian variety of upright growth and free-bearing habit. They also sent Cherry 'Bunyard's Late Movello,' said to be three weeks later than the ordinary variety.

Mr. J. Watkins, Pomona Farm, Withington, Hereford, sent a collection of Damsons and Bullaces.

Mr. J. Booker, Coley Park Gardens, Reading, sent two seedling Nectarines, 'Coley Park Seedling' and 'Booker's Imperial,' the former being the better in flavour.

Mrs. Kimberlin, Finchley, sent Apple 'Kimberlin Seedling.'

Messrs. C. Turner, Slough, staged heavily fruited branches of *Cydonia* (Pyrus) japonica.

Messrs. Rivers, Sawbridgeworth, sent small plants of 'Monarch Plum, carrying a great crop of fruit.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 25, 1900.

PHILIP CROWLEY, Esq., in the Chair, and eighteen members present.

**Awards Recommended :—**

*Silver Knightian Medal.*

To H.M. the Queen, Windsor (gr. Mr. O. Thomas, V.M.H.), for a collection of Plums and Damsons.

To Miss Adamson, South Villa, Regent's Park (gr. Mr. G. Helf), for a collection of vegetables.

To Lord Aldenham, Aldenham House, Elstree (gr. Mr. E. Beckett), for a collection of Capsicums.

*Award of Merit.*

To Grape 'Prince of Wales,' from Messrs. J. Veitch, Chelsea. A sport from 'Mrs. Pince;' berries large, oval, blue-black, and of very good and slightly muscat flavour; bunches large, long, and tapering, and said to keep plump until May. The Committee requested it to be shown again later in comparison with 'Gros Colmar.'

*Cultural Commendation.*

To J. K. Allen, Esq., St. Aubins, Bitterne, Southampton, for six fine dishes of 'Pond's Seedling' Plums.

**Other Exhibits.**

Mr. W. H. Dyer, Mitchett Nurseries, Frimley, sent 'Tomato 'Dyer's Seedling.' It was requested that seed be sent to Chiswick for trial.

Messrs. Dobbie, Rothsay, sent a collection of White Turnips.

Lieut.-Colonel W. J. Bosworth, Cadour Court, Roehampton, S.W. (gr. Mr. Bentley), sent Peach 'Cedar Court.'

A. Kay, Esq., Chiswick, sent a large Vegetable Marrow weighing 27 lb.

Mr. W. Palmer, Andover, Hants, sent a seedling Apple.

Mr. E. Beckett, Aldenham House Gardens, sent Parsnip 'Sutton's Tender and True.' It is quite distinct from 'Student,' and more like a good selection of the old 'Hollow Crown.'

Thos. Leigh, Esq., Portland House, Teignmouth, sent Plum 'Leigh's Gage,' from 'Old Greengage'  $\times$  'Victoria.' Fruit somewhat small and of indifferent flavour; not equal to 'Jefferson,' which it somewhat resembled.

Mr. G. Wythes, V.M.H., Syon House Gardens, staged Melon 'Duchess' from 'Syon House'  $\times$  'Herr of Lockinge.'

Messrs. Jas. Veitch, Chelsea, sent fruiting shoots of 'Thladiantha dubia' (Ord. Cucurbitaceæ). The plant succeeds in a sandy soil in a warm sheltered position, producing its oblong crimson fruit freely. The fruits somewhat resemble a *very* large Gooseberry and are highly ornamental.

Mr. Collins, Surrey Cross, sent a late Black Currant, which the Committee wished to see again next year.

Mr. W. F. Self, Gimton Hall Gardens, Lowestoft, sent Apple 'Emerlene,' of good flavour, but small.

**FLORAL COMMITTEE.**

JANUARY 9, 1900.

W. MARSHALL, Esq., in the Chair, and eighteen members present.

**Awards Recommended :—**

*Silver Flora Medal.*

To Messrs. Sutton, Reading, for Primulas. (Figs. 49, 50.)



FIG. 49.—THE 'STAR' PRIMULA (*P. STELLATA*). (*The Garden.*)

*Award of Merit.*

To *Primula sinensis* 'General French' (votes, unanimous), from Messrs. Sutton. A compact variety with large semi-double crimson-scarlet flowers borne well above the foliage.

To strain of *Primula sinensis* (votes, 18 for), from Messrs. Sutton. The plants are of excellent habit, and the flowers large, of good form and variously coloured.

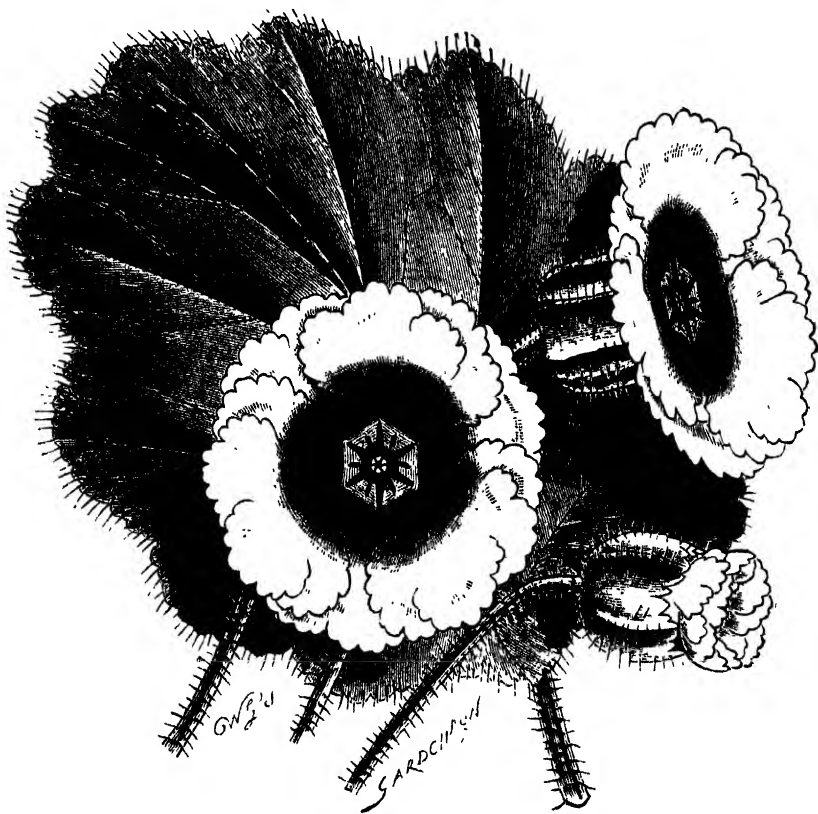


FIG. 50.—PRIMULA 'THE DUCHESS,' (*Gardeners' Chronicle*.)

**Other Exhibits.**

Messrs. Wells, Earlswood, Redhill, sent Chrysanthemums.

Mr. Jones, Lewisham, sent Chrysanthemums.

From Mr. May, Summit, New Jersey, U.S.A., came a new Carnation named 'Olympia.'

Messrs. Low, Enfield, sent Cyclamen.

Messrs. Veitch, Chelsea, sent greenhouse Rhododendrons.

FLORAL COMMITTEE, JANUARY 23, 1900.

W. MARSHALL, Esq., in the Chair, and fourteen members present.

**Awards Recommended:—**

*Silver Flora Medal.*

To Messrs. Cannell, Swanley, for Primulas.

To Messrs. Hill, Lower Edmonton, for Ferns.



FIG. 51.—*GALANTHUS ELWESII*, VAR. *WHITTALLII*. (*The Garden*.)

*Silver Banksian Medal.*

To Messrs. Low, Enfield, for Cyclamen.

*Award of Merit.*

To *Rhododendron* multicolor 'Triton' (Java and multicolor hybrid) (votes, unanimous), from Messrs. J. Veitch, Chelsea. Medium-sized salmon-rose flowers stained with pale yellow in the throat and borne with great freedom in large loose trusses at the points of the slender growths. The plant is of good habit, and a valuable addition to the winter-flowering group of *Rhododendrons*.

*Cultural Commendation.*

To Mr. James Hudson, V.M.H., gardener to Leopold de Rothschild, Esq., Gunnersbury House, Acton, for specimens of *Schaueria flavicoma*, better known in gardens as *Justicia flavicoma*, under which name it is figured in the "Bot. Reg.," t. 1027.

**Other Exhibits.**

Messrs. J. Veitch, Chelsea, sent a small collection of hybrid greenhouse *Rhododendrons*.

Messrs. Barr, Covent Garden, sent *Galanthus Elwesi* Whittall. The Committee asked to see this again. (Fig. 51.)

FLORAL COMMITTEE, FEBRUARY 13, 1900.

C. E. SHEA, Esq., in the Chair, and twenty-two members present.

**Awards Recommended :—**

*Silver Flora Medal.*

To Messrs. Cannell, Swanley, for *Primulas*.

To Mr. John May, St. Margaret's, Twickenham, for *Cyclamen*.

To Messrs. W. Paul, Waltham Cross, for *Clematis indivisa* and *C. i. lobata*.

*Silver Banksian Medal.*

To Messrs. Laing, Forest Hill, for foliage and flowering plants.

**Other Exhibits.**

Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain), sent flowers of *Begonia semperflorens* 'Boule de Neige,' and B. s. 'Triomphe de Lorraine.' The Committee asked to see plants.

From Col. Platt, C.B., Gorddinog, Llanfairfechan (gr. Mr. Coates), came flowers of five varieties of Chinese *Primulas*. The Committee asked to see plants.

W. Nicholson, Esq., Basing Park, Alton, Hants (gr. Mr. W. Smythe), sent flowers of a very pretty Japanese *Azalea* named 'Mauve Queen.' The Committee asked to see a plant.

Messrs. Barr, Covent Garden, sent a small group of hardy flowers and Chinese *Primulas*.

Messrs. Van Waveren & Kruijff, Sassenheim, Haarlem (Holland), sent two varieties of *Astilbes*.

Mr. W. Bull, V.M.H., King's Road, Chelsea, sent *Primula sinensis fimbriata* 'Duke of York.'

Messrs. Sander, St. Alban's, sent flowers of three varieties of *Camellias*. The Committee asked to see plants.

#### FLORAL COMMITTEE, FEBRUARY 27, 1900.

W. MARSHALL, Esq., in the Chair, and twenty-five members present.

#### Awards Recommended :—

##### *Gold Medal.*

To Messrs. W. Paul, Waltham Cross, for a magnificent display of *Camellias* and *Clematis indivisa*.

##### *Silver-gilt Banksian Medal.*

To Messrs. Cannell, Swanley, for *Cyclamen*.

To Mr. Mount, Canterbury, for *Roses*.

##### *Silver Flora Medal.*

To Purnell Purnell, Esq., Woodlands, Streatham Hill, for *Narcissi*.

##### *Silver Banksian Medal.*

To Lord Suffield, Gunton Park, Norwich (gr. Mr. W. Allan), for *Lachenalia Nelsoni*.

To Mr. Jones, Lewisham, for *Daffodils* and *Hyacinths*.

To Messrs. Cutbush, Highgate, for flowering plants.

##### *Bronze Flora Medal.*

To Messrs. Peed, West Norwood, for foliage and flowering plants.

##### *First-class Certificate.*

To *Primula kewensis* (votes, 12 for, 11 against), from the Director, Royal Gardens, Kew. This lovely *Primula* was stated to be a natural hybrid between *P. floribunda* ♀ and *P. verticillata* ♂. In habit and form of leaf it appears to be intermediate between its parents, and the deep yellow flowers are borne in whorls on scapes a foot long. It is an exceedingly free-flowering variety, as the plant exhibited had been flowering continuously from the commencement of October, 1899, and there were still many buds to open. (Fig. 52.)

To *Iris stenophylla* (votes, unanimous), from Messrs. Wallace, Colchester. This charming new species from Asia Minor barely exceeds 6 inches in height, and seems to be allied to *I. persica*. Its flowers are large and exquisitely coloured, the bold standards are pale blue, and the falls deep plum-colour shading to lavender-blue, freely spotted with deep violet.

##### *Award of Merit.*

To *Agapetes buxifolia* (votes, 14 for, 6 against), from J. T. Bennett

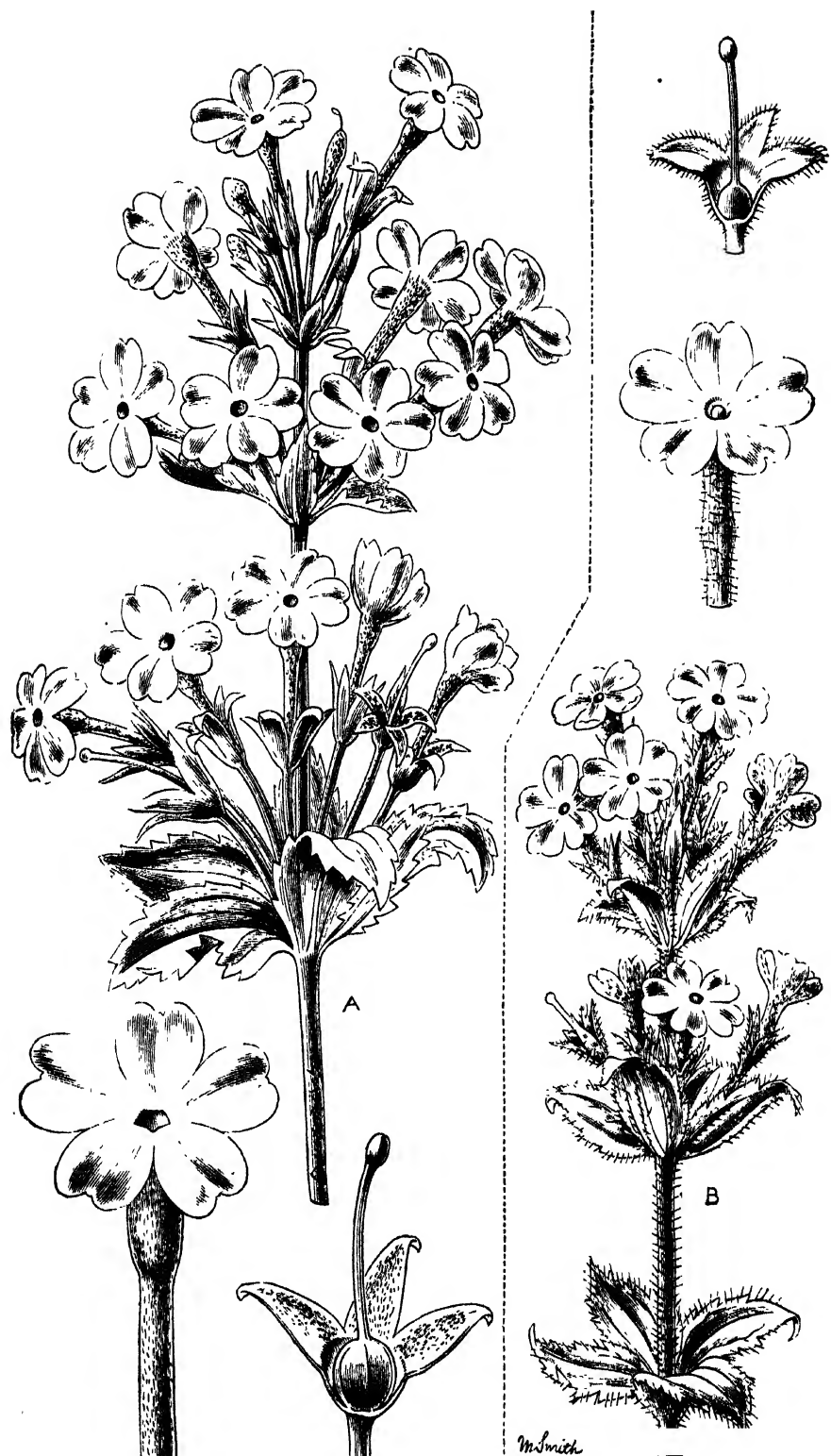


FIG. 52.—A, *PRIMULA KEWENSIS* × B, *P. FLORIBUNDA*. (*Gardeners' Chronicle*.)

Poë, Esq., Homewood, Cheshunt (gr. Mr. J. Downes). This is a very useful and uncommon greenhouse plant, introduced from the eastern



FIG. 53.—*AGAPETES BUAIFOLIA*. (*Gardeners' Chronicle*.)

frontier of Bhotan. It is of bushy habit, with erect stiff brownish shoots clothed with narrow, thick, bright green leaves, and during winter and

early spring bears corymbs of reddish tubular flowers in great abundance. (Fig. 58.)

To *Camellia* 'General Hector Macdonald' (votes, unanimous), from Messrs. Sander, St. Alban's. The large semi-double, rosy-red flowers are borne freely even on small plants, and reminds one forcibly of *C. reticulata*, a very handsome species introduced from China in 1824.

*Cultural Commendation.*

To Mr. W. Coates, gr. to Col. Platt, C.B., Gorddinog, Llanfairfechan, N. Wales, for six varieties of Chinese Primulas.

**Other Exhibits.**

H.M. The Queen, Osborne (gr. Mr. G. Nobbs), sent four varieties of Violets.

Messrs. Earr, Covent Garden, sent a small collection of hardy flowers.

From Messrs. Paul, Cheshunt, came forced flowers of Lilac 'Belle de Nancy.' The Committee asked to see flowers from the open ground.

Messrs. Wallace, Colchester, sent hardy flowers.

Messrs. Ware, Tottenham, sent a small group of spring-flowering bulbs.

FLORAL COMMITTEE, MARCH 18, 1900.

W. MARSHALL, Esq., in the Chair, and twenty-nine members present.

**Awards Recommended :--**

*Silver-gilt Banksian Medal.*

To Messrs. W. Paul, Waltham Cross, for forced flowering shrubs.

To Messrs. James, Farnham Royal, Slough, for *Cinerarias*.

*Silver Flora Medal.*

To Mr. Bowles, Church Road, Hanwell, for *Cyclamen*.

*Silver Banksian Medal.*

To Mr. Mount, Canterbury, for *Roses*.

To Messrs. Hill, Lower Edmonton, for *Ferns*.

To Mr. Russell, Kew Road, Richmond, Surrey, for hardy *Azaleas*.

To Mr. Jones, Lewisham, for *Hyacinths* and *Daffodils*.

To Messrs. Cuthbert, Southgate, for hardy *Azaleas*.

*Bronze Banksian Medal.*

To Messrs. Paul, Cheshunt, for alpine plants.

*Award of Merit.*

To *Pentapterygium serpens* (votes, 14 for), from J. T. Bennett-Poë, Esq., Homewood, Cheshunt (gr. Mr. J. Downes). This interesting greenhouse plant, introduced from the Himalayas in 1884, grows about 3 ft. high, and is closely allied to *Vaccinium*. It is of graceful habit, and the drooping bright red flowers are produced freely along the undersides

of the arching branches, the latter being clothed with small lanceolate rich green leaves.

### Other Exhibits.

H. J. Elwes, Esq., F.R.S., Colesborne, Gloucestershire, sent a plant of *Kniphofia primulina*, also known as *K. longicallis*, a recent introduction from South Africa, which had been in blossom for several weeks in a cool house. It is probable that this charming plant may prove hardy in the milder parts of England. The Committee asked to see blooms from a plant grown in the open ground.

Mr. W. J. Penton, Bowden Hill House Gardens, Chippenham, sent a new Violet named 'James Penton.'

From Mr. Tritton, Norfolk Lodge, Barnet, came a small group of blue-tinted Primroses.

Messrs. Cuthbert, Southgate, sent a pure white hardy Azalea named *leucanthemum alba*. The Committee asked to see this from the open ground.

From Messrs. Sutton, Reading, came a group of dwarf-habited, free-flowering Cinerarias, the flowers flesh-pink and pale blue.

Messrs. Veitch, Chelsea, sent Chinese Primulas, *Cerasus pseudo-cerasus Watereri* and *Rhododendron indicum Kämpferi*. The Committee asked to see a plant of the last named grown in the open air.

Mr. May, Edmonton, sent a group of large-flowered Clematis.

Messrs. Peed, West Norwood, sent a group of spring-flowering plants.

Messrs. Cutbush, Highgate, sent greenhouse plants and forced shrubs.

Messrs. W. Paul, Waltham Cross, sent flowers of a new China Rose named 'Field Marshal.' The Committee asked to see this from the open ground.

From Messrs. Laing, Forest Hill, came a group of foliage and flowering plants.

Mr. W. Palmer, Andover, sent Cineraria 'Marquis of Winchester.'

Messrs. Sander, St. Albans, sent Camellias and *Dianthera illustris*.

Mr. W. P. Spooner, Hextable, Swanley, sent a flower-stand.

### FLORAL COMMITTEE, MARCH 27, 1900.

W. MARSHALL, Esq., in the Chair, and twenty-three members present.

### Awards Recommended :—

#### *Silver-gilt Flora Medal.*

To Messrs. W. Paul, Waltham Cross, for a magnificent display of forced shrubs, *Zenobia speciosa* being particularly noticeable. (Fig. 54.)

#### *Silver-gilt Banksian Medal.*

To St. George's Nursery Co., Hanwell, for Cyclamen.

#### *Silver Flora Medal.*

To Mr. Russell, Richmond, for forced shrubs.

*Silver Banksian Medal.*

To Messrs. Jas. Veitch, Chelsea, for seedling *Clivias* (*Imantophyllums*).

To Messrs. Jas. Veitch, Chelsea, for *Viburnum Tinus lucidum*.

To Mr. J. May, St. Margaret's, Twickenham, for *Cyclamen*.



FIG. 54. - *ZENOBIA SPECIOSA*. (*The Garden*.)

*Bronze Banksian Medal.*

To Messrs. Cuthbert, Southgate, for *Azalea* 'Fielder's White.'

To Messrs. Frank Cant, Colchester, for *Roses*.

*Award of Merit.*

To *Rhododendron* 'Dr. Stocker' (votes, 19 for), from Dr. Stocker, Avery Hill, Eltham (gr. Mr. G. Abbey). If this lovely hybrid, the result

of a cross between an ordinary *Ponticum* variety and one of the Himalayan *Rhododendrons*, proves hardy, it will be a decided gain to the outdoor garden. The large white flowers, spotted with lemon brown at the base of the upper segment, are borne in large loose trusses.

To Zonal *Pelargonium* 'All Flower' (syn. Miss G. Ashworth) (votes, 14 for), from Messrs. Cannell, Swanley. A very floriferous variety with well-formed trusses of pure white double or semi-double flowers, borne on stout stems well above the foliage. The plant is of dwarf compact habit.

To strain of *Cyclamen persicum fimbriatum* (votes, 14 for, 8 against), from St. George's Nursery Co., Hanwell. This strain is remarkable for the moss-curved leaves and variously coloured fringed flowers, the latter being of medium size, borne rather sparingly. (Fig. 55.)

To Violet 'La France' (votes, 13 for, 9 against), from Messrs. House, Westbury-on-Trym. This is, perhaps, best described as being similar to that charming variety 'Princess of Wales.' The plant is of compact habit, free-flowering, and the large bluish-purple flowers are slightly fragrant, and carried on long stems well above the foliage.

### Other Exhibits.

J. J. Thornycroft, Esq., Eyot Villa, Chiswick Mall (gr. Mr. F. Mears), sent two large beautifully flowered plants of *Iris germanica* to show its value for greenhouse purposes. The plants exhibited had been in blossom upwards of three weeks.

From J. A. Kenrick, Esq., Berrow Court, Edgbaston (gr. Mr. A. Cryer), came a group of seedling *Hippeastrums*.

Rev. C. T. Digby, Wareham Rectory, Norfolk, sent a seedling Primrose.

C. Springham, Esq., Llandogo-on-Wye, sent flowers of *Helleborus viridis*.

From Dr. Stocker, Avery Hill, Eltham (gr. Mr. G. Abbey), came several lovely sprays of *Acacia Riceana*. This is a charming Australian plant for planting out in the conservatory border, for clothing pillars, rafters, &c.

Miss Meysey-Thompson, Holme Priory, Wareham (gr. Mr. R. Coles), sent an unnamed free-flowering Violet.

Mr. R. B. Leech, The Gardens, Wood Hall, Dulwich, sent *Clivia* 'Empress.'

Mr. Hayward Mathias, Thames Ditton, sent Carnation 'Hypatia.'

Messrs. J. House, Westbury-on-Trym, sent a small collection of Violets.

F. W. Moore, Esq., Glasnevin, Dublin, sent flowers of *Chionodoxa Lucilæ alba*.

Messrs. Ware, Tottenham, sent hardy flowers.

Messrs. Sander, St. Albans, sent *Dracæna albanense striata* and *Pteris argentea*.

Messrs. Peed, West Norwood, sent *Clivias*, *Acacias*, and forced shrubs.

From Mr. Jones, Lewisham, came Daffodils and Tulips.

Messrs. Wallace, Colchester, sent hardy flowers.

From Messrs. Cutbush, Highgate, came a group of forced shrubs.

Messrs. Paul, Cheshunt, sent the double Persian Lilac.



FIG. 55.—CYCLAMEN PERSICUM FIMBRIATUM. (*The Garden.*)

## FLORAL COMMITTEE, APRIL 10, 1900.

. W. MARSHALL, Esq., in the Chair, and eighteen members present.

**Awards Recommended:—***Silver-gilt Flora Medal.*

To D. H. Shilson, Esq., Tremough, Penryn, Cornwall (gr. Mr. R. Gill), for a magnificent collection of Himalayan Rhododendrons, of which many were seedlings.

To Mr. Mount, Canterbury, for Roses.

*Silver-gilt Banksian Medal.*

To Messrs. W. Paul, Waltham Cross, for flowering shrubs.

To Messrs. Frank Cant, Colchester, for Roses.

*Silver Flora Medal.*

To Messrs. Cuthbert, Southgate, for flowering trees and shrubs.

To Messrs. Cannell, Swanley, for Zonal Pelargoniums.

To Messrs. Williams, Upper Holloway, for forced hardy shrubs.

*Silver Banksian Medal.*

To Purnell Purpell, Esq., Woodlands, Streatham Hill, for Alpines.

To Messrs. Hill, Lower Edmonton, for tinted and variegated Ferns.

To Mr. Russell, Richmond, for forced hardy shrubs.

*Award of Merit.*

To Rhododendron Shilsoni (votes, 13 for, 1 against), from D. H. Shilson, Esq., Tremough, Penryn, Cornwall (gr. Mr. R. Gill). This is a hybrid raised by the exhibitor, between R. Thomsoni and R. barbatum, both Himalayan species. The progeny is of good habit and very floriferous, the leaves and flowers bearing a close resemblance to R. Thomsoni. The deep crimson or dull red campanulate flowers, about two inches across, are borne in neat trusses, and vary from a dozen to eighteen in a truss. It is quite hardy in Cornwall, but in the London district is likely to need some protection in severe winters, and its flowers would be apt to get cut by late frosts. It will prove an excellent plant for unheated glass-houses.

To Pyrus malus angustifolia, fl. pl. (votes, unanimous), from Messrs. W. Paul, Waltham Cross. A remarkably pretty free-flowering semi-double ornamental Apple, the flowers when fully expanded being a delicate shade of pink, and the unopened buds warm rose pink. The tree is vigorous, thoroughly hardy, and of good habit.

To Azalea mollis 'Mrs. A. E. Endtz' (votes, 10 for, 8 against), from Messrs. Cuthbert, Southgate. An advance on the well-known 'Anthony Koster.' The flowers are very large, deep orange yellow with a faint suspicion of salmon, and suffused with orange on the upper segment.

To Ghent Azalea 'Duchess of Wellington' (votes, 12 for), from Messrs. Cuthbert. The small blush-pink flowers, marked with crimson

on the upper segments, are borne in compact trusses with great freedom. (Fig. 56.)

To *Rhododendron* 'H. Elliott' (votes, 9 for, 5 against), from Messrs. Elliott, Hurstpierpoint, Sussex. A very handsome greenhouse *Rhododendron*, said to be a cross between *R. formosum* ♀ and *R. Edgeworthi* ♂. The large trusses of bold white flowers are faintly spotted with pale yellow on the upper segment and deliciously scented.

To *Hippeastrum* 'Titan' (votes, unanimous), from Messrs. James

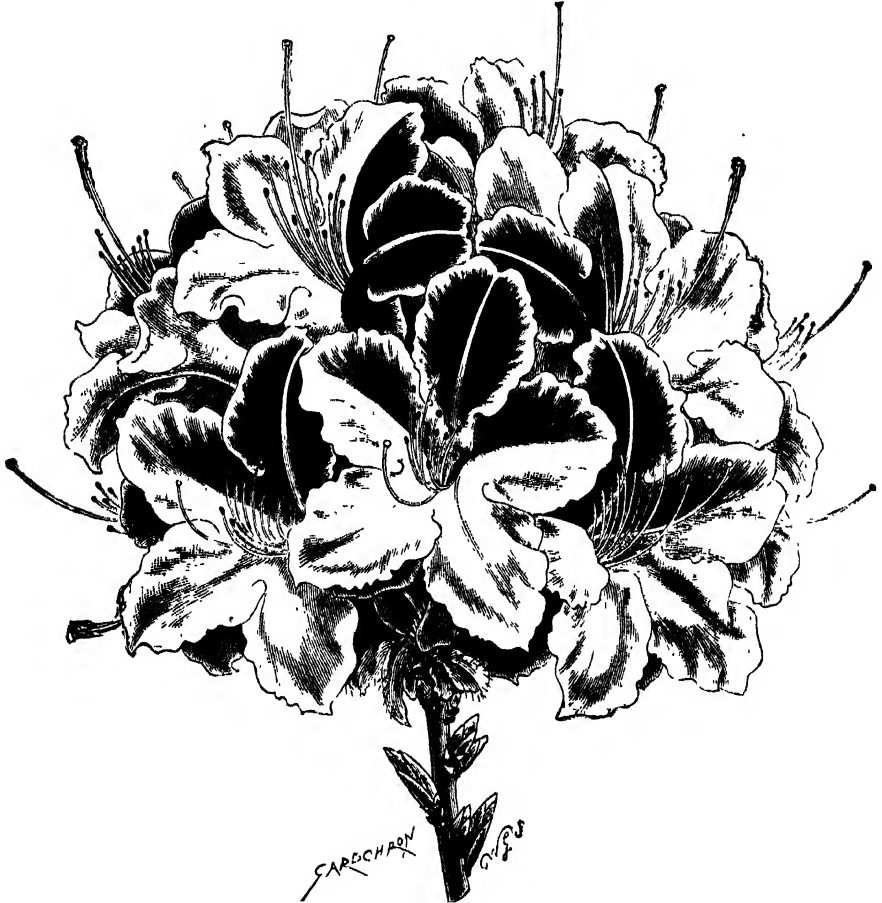


FIG. 56.—AZALEA 'DUCHESS OF WELLINGTON.' (*Gardeners' Chronicle*.)

Veitch, Chelsea. Large campanulate white flowers with prominent rosy scarlet veins.

To *Hippeastrum* 'Zephyr' (votes, 9 for, 5 against), from Messrs. James Veitch. Medium-sized red flowers, mottled and edged with white and touched with green in the centre.

To *Polemonium confertum melittum* (votes, unanimous), from Messrs. Jackman, Woking. This is a lovely little plant from the Rocky Mountains, where it occurs at a lower elevation than the type. The plant exhibited had been lifted from the open ground in bud, was about ten inches high, with long narrow small rich green pinnate leaves, and carried

dainty fragrant cream-white flowers in terminal and axillary racemes. (Fig. 57.)

To Azalea 'Madame A. de Smet' (votes, 9 for, 4 against), from Messrs. Paul, Cheshunt. A beautiful hardy variety with great clusters of medium-sized white flowers, the upper segments stained with lemon yellow.

To H. T. Rose, 'L'Innocence' (votes, 12 for, 2 against), from Messrs.



FIG. 57. —POLEMONIUM CONFERTUM. (*Gardeners' Chronicle*.)

Paul, Cheshunt. A lovely sweet-scented Rose with long pointed white or cream-white flowers.

*Cultural Commendation.*

To Mr. W. Bain, gr. to Sir Trevor Lawrence, Bart., Burford, Dorking, for an exceptionally well-grown plant of *Anthurium Scherzerianum* Burfordiense.

## Other Exhibits.

Dr. Stocker, Avery Hill, Eltham, Kent (gr. Mr. G. Abbey), sent flowers of three hybrid Rhododendrons.

C. Dauboy, Esq., Truro, sent a truss of flowers of Rhododendron cilicale, grown from seed collected in China by the Abbé Delavey. The flowers are small and white, very delicately suffused with blush pink.

J. T. Bennett-Poë, Esq., Homewood, Cheshunt (gr. Mr. J. Downes), sent a flowering plant of Scutellaria incarnata Triana. A plate of this uncommon South American plant is given in the "Bot. Mag.," tab. 5185.

Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. James Hudson, V.M.H.), sent flowering growths of Maranta Warscewiczii, a fine foliage stove plant indigenous to South America.

F. W. Campion, Esq., Colley Manor, Reigate (gr. Mr. J. Fitt), sent a large plant of Calceolaria violacea bearing a profusion of delicate flowers, and flowering shoots of the Loquat, Photinia japonica, grown on a south wall in the open air.

From Mr. Erselius, Romford, Essex, came flowers of a double white Petunia. The Committee asked to see a plant.

Messrs. Peed, West Norwood, sent a group of flowering plants.

Messrs. Jackman, Woking, sent hardy flowers.

From Messrs. Paul, Cheshunt, came Roses and hardy flowers.

Mr. Piper, Uckfield, Sussex, sent flowers of Tea Rose 'Sunrise.'

Messrs. Cutbush, Highgate, sent flowering plants.

Messrs. Sander, St. Albans, sent Pteris argentea.

## FLORAL COMMITTEE, APRIL 24, 1900.

W. MARSHALL, Esq., in the Chair, and twenty-eight members present.

## Awards Recommended:—

### *Silver-gilt Flora Medal.*

To Mr. H. B. May, Edmonton, for a large group of flowering plants.

To Messrs. Paul & Son, Cheshunt, for Roses and Alpines.

### *Silver Flora Medal.*

To Messrs. Frank Cant, Colchester, for Roses.

To Mr. Rumsey, Waltham Cross, for Roses.

### *Silver Banksian Medal.*

To Sir Francis T. Barry, Bart., St. Leonards Hill, Windsor (gr. Mr. R. Brown), for Camellias grown out of doors.

To Wilberforce Bryant, Esq., Stoke Park, Slough (gr. Mr. D. Kemp), for twenty-four huge Hippeastrums grown from seed sown in March 1894.

To Messrs. James Veitch, Chelsea, for Cinerarias, Lilacs, and Hydrangeas.

To Messrs. Laing, Forest Hill, for greenhouse plants and forced hardy shrubs.

To Mr. Russell, Richmond, for Japanese Maples.

To Messrs. Carter, High Holborn, for Cinerarias.

To Messrs. Hogg & Robertson, Dublin, for Tulips.

*Bronze Flora Medal.*

To Messrs. Cutbush, Highgate, for flowering plants.

*Bronze Banksian Medal.*

To Messrs. Jackman, Woking, for hardy flowers.

To Messrs. Peed, West Norwood, for flowering plants.

*Award of Merit.*

To *Rhododendron Abbeyi* (votes, 21 for), from Dr. Stocker, Avery Hill, Eltham (gr. Mr. G. Abbey). An immense truss of large campanulate delicate pink flowers, veined and suffused with rose on the exterior of the petals.

To *Arabis albidula plena* (votes, 16 for, 4 against) from Mr. Amos Perry, Winchmore Hill; Messrs. Wallace, Colchester; Messrs. Paul & Son, Cheshunt. A very pretty, hardy, dwarf, free-flowering plant with rich green evergreen foliage and rather slender, erect racemes of double pure-white flowers. This is a useful spring bedding plant.

To *Mertensia virginica rubra* (votes, 10 for), from Mr. A. Perry, Winchmore Hill. The growth and general habit of the plant are similar to those of the type, and the terminal clusters of bright rose-pink flowers are borne in great abundance.

To *Auricula 'Celtic'* (votes, 12 for, 5 against), from Messrs. Barr, Covent Garden. A free-flowering border variety with sweet-scented rich yellow flowers.

To *Saxifraga aretioides primulina* (votes, 14 for), from Mr. E. H. Jenkins, Queen's Road, Hampton Hill. This is a very dwarf and exceedingly beautiful moss-like *Saxifraga*, probably the result of a cross between *S. apiculata* and *S. aretioides*. It has small glaucous leaves and bears a great profusion of delicate sulphur-yellow flowers on stalks three inches high. The plant is slow in growth, and the one exhibited is perhaps the finest specimen in the country, as it carried about a hundred flower spikes, each of which bore from three to five flowers and unopened buds.

To *Petunia 'Charlotte'* (votes, 14 for, 5 against) from Mr. P. Erselius, Church Lane, Romford. A very fine variety with large, well-formed, double white flowers with a faint suspicion of green in the centre. The plant is of excellent habit.

To *Canna 'Secrétaire Chabanne'* (votes, unanimous), from Messrs. Cannell, Swanley. A dwarf floriferous variety with great trusses of bright orange flowers.

*Cultural Commendation.*

To Mr. Jas. Hudson, V. M. H., gardener to Leopold de Rothschild, Esq., Gunnersbury House, Acton, for magnificent flowers of *Nymphæa stellata*.

### Other Exhibits.

Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain), sent very fine flowers of *Lapageria rosea*, 'The Knoll' variety.

From the Director, Royal Gardens, Kew, came a small group of *Cineraria* 'Lady Thiselton Dyer,' the result of crossing *C. Heritieri* with a blue-flowered garden *Cineraria*. The progeny is of graceful habit, and produces a large branching head of pretty white and blue flowers.

Mrs. Burns, North Mymms Park, Hatfield (gr. Mr. C. R. Fielder), sent a seedling *Hippeastrum* named 'Phœbe.'



FIG. 58.—SHOW AUBICULAS. (*The Garden.*)

F. W. Campion, Esq., Trumpet's Hill, Reigate (gr. Mr. J. Fitt), sent a plant of *Trachelospermum* (*Rhyncospermum*) *jasminoides*, smothered with flower, and specimens of *Photinia serrulata*.

The Duke of Rutland, Belvoir Castle, Grantham (gr. Mr. W. H. Divers), sent *Anemone pulsatilla rubra*.

H.M. The Queen, Osborne (gr. Mr. G. Nobbs), sent plants of an Arum Lily.

J. Colman, Esq., Gatton Park, Reigate (gr. Mr. W. P. Bound), sent Carnation 'Grand Duchess Olga.'

From B. D. Webster, Esq., Newton Abbot, came a bunch of flowers of very beautiful Anemone, which the Committee considered to be a variety of *A. fulgens annulata*.

Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.), sent fourteen varieties of scented-leaved Pelargoniums.

Miss Rogers, River Hill, Sevenoaks, sent Himalayan Rhododendrons.

Mr. W. J. Godfrey, Exmouth, sent plants of Pelargonium 'Emmanuel Lias,' a variety with very showy flowers.

Mr. E. Kromer, Bandon Hill, West Croydon, sent *Calathea crocata*, a plant with rich orange flowers introduced from Brazil in 1875.

From the Guildford Hardy Plant Nursery, Millmead, Guildford, came an interesting display of Alpines &c.

Messrs. Cuthbert, Southgate, sent a collection of Ghent Azaleas.

Messrs. Barr, Long Ditton, sent a small collection of Dwarfed Japanese Trees.

Mr. G. W. Piper, Uckfield, Sussex, sent flowers of Tea Rose 'Sunrise.'

Messrs. Cannell, Swanley, sent Begonias.

The Annual Show of Show Auriculas by the National Auricula Society was held this day. (Fig. 58.)

#### FLORAL COMMITTEE AT CHISWICK, APRIL 26, 1900.

W. MARSHALL, Esq., in the Chair, and seven members present.

#### Awards Recommended :—

##### *Highly Commended.*

##### Single-flowered Tulips :

Mon Trésor	Pottebakker White
La Matelas	Bacchus
Ophir d'Or	Vermilion Brilliant
Maes	Epaminondas
Proserpine	Van-der-Neer

##### Keizerskroon.

A descriptive report on Tulips will appear when the trial is completed.

#### FLORAL COMMITTEE AT CHISWICK, MAY 2, 1900.

W. MARSHALL, Esq., in the Chair, and four members present.

#### Awards Recommended :—

##### *Highly Commended.*

##### Single-flowered Tulips :

Thomas Moore, Duchesse de Parme, Hector, Admiral Reinier, Joost Van Vondel, Joost Van Vondel White, David Tenier, Grand Duc de Russe, Pink Beauty, Queen of the Netherlands, Cottage Maid, La Reine, Dussart, and La Belle Alliance.

Double-flowered Tulips :

Tournesol, Imperator Rubrorum, and El Toreador.

A descriptive report on Tulips will be found on page 178.

FLORAL COMMITTEE, MAY 8, 1900.

W. MARSHALL, Esq., in the Chair, and twenty-three members present.

**Awards Recommended :—**

*Silver-gilt Flora Medal.*

To Mr. A. Perry, Winchmore Hill, for hardy flowers.

*Silver-gilt Banksian Medal.*

To Messrs. Hogg & Robertson, Dublin, for Tulips.

To Messrs. Barr, Covent Garden, for hardy flowers.

*Silver Flora Medal.*

To Messrs. Cutbush, Highgate, for flowering plants.

To Mr. H. J. Jones, Lewisham, for Tulips and Daffodils.

To Messrs. Cheal, Crawley, for sprays of hardy trees and shrubs.

*Silver Banksian Medal.*

To Messrs. Jackman, Woking, for Alpines and herbaceous flowers.

To Messrs. Laing, Forest Hill, for hardy forced shrubs.

*Bronze Banksian Medal.*

To Miss Jekyll, V.M.H., Munstead Wood, Godalming (gr. Mr. A. Zumbach), for a most glorious group of white and yellow Polyanthus Primroses (Munstead strain).

To Mr. M. Prichard, Christchurch, Hants, for hardy flowers.

*First-class Certificate.*

To *Asparagus Sprengeri variegatus* (votes, unanimous), from Messrs. Sander, St. Albans. This is a sport from the type from which it differs by reason of its silvery grey foliage. It is a splendid basket plant.

*Award of Merit.*

To *Tulipa Borszczowi* (votes, unanimous), from Miss Willmott, V.M.H., Warley, Essex. A rare Asiatic species with well-formed flowers borne on slender stems about ten inches in length, colour orange yellow stained with orange red on the exterior of the petals and marked with yellow at the base. (Fig. 59.)

To *Tulipa Kolpakowskiana* (votes, unanimous), from Miss Willmott, V.M.H. Another charming species introduced from Turkestan so long ago as 1577. Its campanulate flowers, about 2½ inches across, are slightly fragrant, variable in colour, but generally bright scarlet, and have a yellow base blotched with black. The exterior of the petals is suffused with orange red.

To *Rhododendron* 'Coombe Royal' (votes, 12 for, 1 against), from Messrs. R. Veitch, Exeter. A beautiful Himalayan hybrid with smooth



FIG. 59.--TULIPA BORESZCZOWI. (*Gardeners' Chronicle*.)

bright-green leaves and bold trusses of large bell-shaped flowers suffused with delicate pink and spotted with brown on the upper segments.

To *Camellia* 'Devonia' (votes, 11 for, 1 against), from Messrs. R. Veitch, Exeter. A single-flowered *Camellia* with well-rounded pure-white petals of great substance and beauty. The large cluster of golden-yellow stamens in the centre gives additional beauty.

To *Geum montanum aurantiacum* (votes, 12 for), from Mr. A. Perry, Winchmore Hill. A charming dwarf-growing plant, probably a hybrid between *G. montanum* and *G. Heldreichi*. It is a pretty plant for the rock garden and produces lovely orange-yellow flowers.

To *Azaleodendron* 'Directeur Rodigas' (votes, 9 for, 5 against), from Messrs. Jas. Veitch, Chelsea. This is the result of crossing a hardy deciduous *Azalea* with an evergreen *Rhododendron*. It bears large trusses of rose-coloured flowers spotted with brownish crimson on the upper segments. The unopened buds are rose pink.

To Single Tulip 'Pink Beauty' (votes, unanimous), from Messrs. Hogg & Robertson, Dublin. A grand variety with large shapely flowers, bright rose-pink shading to blush-white near the yellow base. The central portion of each of the outer petals is blush-white.

To Single Tulip 'Hector' (votes, unanimous), from Messrs. Hogg & Robertson. An attractive variety with large orange-red flowers deeply edged with rich yellow. It is an improvement on the well-known 'Duchesse de Parme.'

### Other Exhibits.

Miss Lilla Rogers, Riverhill, Sevenoaks, sent a very interesting display of Himalayan *Rhododendrons*.

Dr. Stocker, Avery Hill, Eltham (gr. Mr. G. Abbey), sent flowers of a new seedling *Rhododendron* named 'Ethel Stocker,' a pleasing variety with large loose trusses of white flowers spotted with rose on the upper segment.

Mr. R. Dean, V.M.H., Ranelagh Road, Ealing, sent a double-flowered *Auricula* named 'Sir George.'

Messrs. Frank Cant, Colchester, sent Roses.

From Messrs. Carter, High Holborn, came a nice collection of *Cinerarias*.

Messrs. Jas. Veitch, Chelsea, sent a group of hardy *Azaleas*.

Messrs. Ware, Feltham, sent Alpines and herbaceous flowers.

Mr. Knowles, Woking, sent a small group of *Daphne cneorum*.

From Messrs. Elliot, Hurstpierpoint, came a new Tree *Carnation* named 'Soldier of the Queen.'

Messrs. Wallace, Colchester, sent cut flowers.

Messrs. Paul, Cheshunt, sent a small plant of *Ceanothus* 'Indigo.'

FLORAL COMMITTEE AT CHISWICK, MAY 9, 1900.

W. MARSHALL, Esq., in the Chair, and eight members present.

### Awards Recommended:—

*Award of Merit.*

To double-flowered Tulip 'El Toreador.'

To single-flowered Tulip 'Queen of the Netherlands.'

*Highly Commended.*

Double-flowered Tulips 'Vuurbaak,' 'William III.,' and 'Voltaire.'

Single-flowered Tulips 'Rosa Mundi,' 'Couleur de Cardinal,' and 'Cerise Gris de Lin.'

A descriptive report on Tulips will appear when the trial is completed.

## FLORAL COMMITTEE AT CHISWICK, MAY 16, 1900.

W. MARSHALL, Esq., in the Chair, and seven members present.

**Awards Recommended :—***Highly Commended.*

Single-flowered Tulips 'Gesneriana Bouton d'Or,' 'Royal White,' 'Picotee,' 'Golden Crown,' and 'Summer Beauty.'

Double-flowered Tulip 'Rose Blanche.'

Darwin Tulips 'Phœcia,' 'Donders,' 'Rev. H. H. Dombraïn,' 'Fräulein Amberg,' 'Auber,' 'Gustave Doré,' 'Europe,' 'Mr. Farncombe Sanders,' and 'Professor M. Foster.'

A descriptive report on Tulips will appear when the trial is completed.

## FLORAL COMMITTEE, TEMPLE GARDENS, MAY 23, 1900.

W. MARSHALL, Esq., in the Chair, and twenty-eight members present.

**Awards Recommended :—**

The list of Cups and Medals awarded by the Council will be found on page xvi.

*Award of Merit.*

To Bougainvillea 'Maud Chettleburgh' (votes, 14 for, 4 against), from Colonel Rous, Worstead House, Norwich (gr. Mr. W. Chettleburgh). This is perhaps best described as an improvement on *B. glabra*. It is very floriferous, with large brightly coloured bracts.

To Echium Callithyrsum (votes, unanimous), from the Hon. John Boscawen, Tregye, Perranwell, Cornwall. The deep bluish-violet flowers of this uncommon Echium are borne in great profusion on very large stout spikes. The flowers exhibited were cut from plants growing in the open air.

To double Begonia 'Mrs. Hall' (votes, 12 for), from Messrs. Laing, Forest Hill. This is a magnificent variety with large shapely salmon-pink flowers, shading to delicate pink in the centre.

To Border Carnation 'Herbert J. Cutbush' (votes, 9 for, 2 against), from Messrs. Cutbush, Highgate. Large bright scarlet substantial flowers, but unfortunately almost, if not quite, scentless.

To Tree Pæony 'Lady Sarah Wilson' (votes, 10 for, 2 against), from Messrs. Kelway, Langport. The delicately fragrant flowers of this new variety are exceptionally large, semi-double, of good form, pink, deeping

to rose on the lower half of the petals. The large cluster of golden-yellow stamens in the centre gives additional beauty.

To double Begonia 'Lord Roberts' (votes, unanimous), from Messrs. Ware, Feltham. A pretty variety with large blush-white flowers, deeply edged and suffused with rosy scarlet.

To double Begonia 'Mr. W. G. Valentine' (votes, unanimous), from Messrs. Ware. Beautifully formed bright scarlet Camellia-like flowers.



FIG. 60. — SCHIZANTHUS 'WISETONENSIS.' (*Gardeners' Chronicle*.)

To Strain of Gloxinias (votes, unanimous), from Mr. J. Upton, Irlam, Manchester. A superb strain with large substantial variously coloured flowers. The plants are of sturdy growth, and free in blossom.

To Tulipa galatica (votes, 6 for, 5 against), from Mr. C. G. Van Tubergen, jun., Haarlem, Holland. A dwarf-growing species with broad undulated leaves and deep yellow flowers blotched with olive green at the base of each segment.

To Lilium Thunbergianum 'Orange Queen' (votes, 11 for), from

Messrs. Wallace, Colchester. This plant grows about 18 inches high and bears large apricot-yellow flowers freely spotted with brown.

To Ivy-leaved Pelargonium 'Mrs. John G. Day' (votes, 9 for), from Mr. H. J. Jones, Lewisham. A free-growing variety, with large trusses of brilliant scarlet semi-double flowers.

To Strain of Schizanthus Wisetonensis (votes, unanimous), from Messrs. Hugh Low, Enfield. This is a wonderfully pretty strain, with



FIG. 61.—*EDRAIANTHUS DALMATICUS*. (*Gardeners' Magazine*.)

flowers of delicate shades of white, pink, rose, crimson, &c. The plants exhibited were about 18 inches high and exceptionally free in blossom. (Fig. 60.)

To *Oenothera speciosa rosea* (votes, unanimous), from Mr. A. Perry, Winchmore Hill. A lovely hardy perennial with bright rose-pink single flowers. The habit is identical with that of the type.

To *Tulipa Batalini* (votes, 7 for, 4 against), from Messrs. Barr, Covent Garden. A rare and beautiful species with small lemon-yellow flowers

with a brown base. The flowers are borne on slender stems 10 inches high, and the leaves are long and slender.

To Cottage-garden Tulip 'Mrs. Moon' (votes, unanimous), from Messrs. Barr. Flowers very large, of excellent shape, the petals rather sharply pointed, and the colour rich yellow with a golden centre.

To English Tulip 'Mabel' (votes, 6 for, 3 against), from Messrs. Barr. Beautifully formed rose-coloured flowers with a white base and striped down the centre of each of the three inner petals with white.



FIG. 62.—*CHAMELIRIUM CAROLINIANUM*. (*Gardeners' Magazine*.)

To *Edraianthus dalmaticus* (votes, 10 for, 2 against), from Messrs. Jackman, Woking. This charming hardy plant is indigenous to the mountains of Dalmatia, and was introduced to this country upwards of twenty years ago. It is well adapted for the rock garden, and grows about 6 inches high, with narrow leaves, and bears a profusion of violet-blue flowers in terminal clusters. (Fig. 61.)

#### *Botanical Certificate.*

To *Chamelirium carolinianum* (votes, unanimous), from Messrs. Ware, Feltham. A dainty little hardy plant with deep glossy green leaves





FIG. 63.- EREMURUS HIMALAICUS. (*Journal of Horticulture*.)



and slender spikes 10 inches long wreathed with small white flowers. (Fig. 62.)

### Other Exhibits.

M. Fl. Claes, Etterbeck, Brussels, sent Ferns.

From Mr. Godfrey, Exmouth, came Pelargonium 'Emmanuel Lias.'

Messrs. Fromow, Chiswick, sent a new hardy Rhododendron named 'Lord Roberts.'

Mr. S. Bide, Farnham, Surrey, sent Canna 'Primrose League.'

Mr. Palmer, Andover, sent a new Pink named 'Vesta.'

From Messrs. House, Westbury-on-Trym, came two new Violas.

Mr. C. G. Van Tubergen, jun., Haarlem, sent flowers of Iris paradoxa and I. Barnumæ.

Mr. Anstiss, High Street, Brill, sent a double-flowered yellow Tulip.

### FLORAL COMMITTEE AT CHISWICK, MAY 24, 1900.

W. MARSHALL, Esq., in the Chair, and six members present.

#### Awards Recommended :—

*Highly commended.*

Single-flowered Tulips :—

Maculata major, Columbus, Isabella, Macrospeila, Goldflake, Billietiana, Billietiana Sunset, Fulgens, Gesneriana spathulata, Stella. and Persica.

Darwin Tulips :—

Landelle, Minister Roell, Calypso, and Madame Bosboom Toussaint.

A descriptive report on Tulips will appear when the trial is completed.

### FLORAL COMMITTEE, JUNE 5, 1900.

W. MARSHALL, Esq., in the Chair, and nineteen members present.

#### Awards Recommended :—

*Gold Medal.*

To Messrs. James Veitch, Chelsea, for a magnificent exhibit of Eremurus himalaicus (fig. 63), E. robustus, and Primula japonica.

*Silver-gilt Flora Medal.*

To Messrs. Kelway, Langport, Somerset, for Pæonies and Pyrethrums.

*Silver Flora Medal.*

To Messrs. James Veitch, Chelsea, for Gloxinias.

To Messrs. Dobbie, Rothesay, for Sweet Peas.

To Messrs. Jackman, Woking, for hardy plants.

To Mr. H. J. Jones, Lewisham, for Begonias and cut flowers.

To Messrs. Wallace, Colchester, for hardy flowers.

*Silver Banksian Medal.*

- To Mr. Dixon, Woodside Gardens, Hailsham, for Carnations.
- To Messrs. Barr, Covent Garden, for hardy flowers.
- To Messrs. W. Paul, Waltham Cross, for pot Roses.
- To Messrs. W. Paul, Waltham Cross, for Rhododendrons.
- To Messrs. Ware, Feltham, for hardy flowers.

*First-class Certificate.*

To Rhododendron 'Pink Pearl' (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain), a magnificent variety with unusually bold trusses of large bell-shaped bright pink flowers spotted with red on the upper segment. The unopened buds are deep rose. It was suggested that it had *R. Aucklandi* blood in it, but the flowers exhibited were cut from plants growing in the open air, and it appeared to be perfectly hardy. (Fig. 64.)

*Award of Merit.*

To *Syringa vulgaris* (Lilac) 'Madame Abel Chatenay' (votes, unanimous), from W. Marshall, Esq., Auchinraith, Bexley. This is perhaps the best double white Lilac in cultivation. Its delightfully fragrant flowers are perfectly double, snow-white, and borne on loose spikes with much freedom.

To Tree *Pæony* 'Cream Perfection' (votes, 10 for, 5 against), from Messrs. Wallace, Colchester. A distinct single variety with broad fringed petals, cream-coloured, stained with rose at the base.

To Double *Begonia* 'Gladys Hemsley' (votes, 9 for, 4 against), from Mr. H. J. Jones, Lewisham. Medium-sized Camellia-like flowers, pale pink, passing to white in the centre.

To strain of *Streptocarpus achimeniflorus* (votes, unanimous), from Messrs. James Veitch, Chelsea. This strain is the result of crossing *S. polyanthus* with Veitch's hybrids. The plants are sturdy in habit and the flowers large, substantial, and variously coloured.

To Tree *Pæony* 'Lord Roberts' (votes, unanimous), from Messrs. Kelway, Langport. A very fine variety with large flowers, white shading to pale pink at the basal portion of the petals. The golden anthers in the centre of the flower are very showy.

To *Pæony* 'Lady Curzon' (votes, unanimous), from Messrs. Kelway. This bears some resemblance to the beautiful *P. delicatissima*. The flower is of good depth, white shading to blush pink.

To H. T. Rose 'Tennyson' (votes, 11 for, 4 against), from Messrs. W. Paul, Waltham Cross. A sweet-scented variety in the way of 'Lady Mary Fitzwilliam,' with stout petals, pale pink or flesh colour passing to white. It is sturdy in habit.

To *Rosa Wichuriana* 'Pink Roamer' (votes, 14 for), from Messrs. W. Paul. This is a very free-growing Rose, well adapted for clothing arbours, verandahs, pergolas, &c. The flowers are single, of medium size, rose shading to pink near the white centre.

To *Rosa sinica* 'Anemone' (votes, 13 for, 1 against), from Messrs. Paul & Son, Cheshunt. A charming single Rose with large Anemone-like





FIG. 64.—RHODODENDRON 'PINK PEARL.' (*Journal of Horticulture*.)

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rose-coloured flowers suffused with silvery pink. In habit it is similar to *R. sinica* and hardy.

### Other Exhibits.

F. W. Moore, Esq., V.M.H. Glasnevin, Dublin, sent flowers of a new herbaceous *Pæony*.

Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain), sent *Syringa Bretschneideri* and a remarkably well-grown plant of *Anthurium Lawrencei*.

Lord Gerard, Eastwell Park, Kent (gr. Mr. H. Walters), sent a group of Malmaison Carnation 'Lady Gerard.'

Messrs. Paul, Cheshunt, sent *Senecio lilacinus*.

Messrs. Cuthbert, Southgate, sent *Astilbes*.

Messrs. Laing, Forest Hill, sent *Begonias*.

Mr. S. Bide, Farnham, sent *Calla* 'Primrose League.'

Mr. W. J. Godfrey, Exmouth, sent Poppies.

Mr. R. H. Bath, Wisbech, sent a good yellow-flowered Carnation named 'Lord Roberts.'

Messrs. Cutbush, Highgate, sent Carnation 'Fanny Wilcox.'

### FLORAL COMMITTEE, JUNE 19, 1900.

W. MARSHALL, Esq., in the Chair, and twenty-three members present.

### Awards Recommended : --

#### *Silver-gilt Flora Medal.*

To Martin R. Smith, Esq., Warren House, Hayes, Kent (gr. Mr. C. Blick), for a grand display of Malmaison Carnations.

To Lady Pigott, Wexham Park, Slough (gr. Mr. J. Fleming), for a group of foliage and flowering plants.

To Mr. G. Prince, Oxford, for Roses and Sweet Peas.

#### *Silver-gilt Banksian Medal.*

To Mr. Amos Perry, Winchmore Hill, for hardy flowers.

To Messrs. Kelway, Langport, for *Pæonies*, *Delphiniums*, and *Gail-lardias*.

#### *Silver Flora Medal.*

To F. W. Champion, Esq., Colley Manor, Reigate (gr. Mr. J. H. Fitt), for Roses and Hydrangeas.

To Mr. H. J. Jones, Lewisham, for Sweet Peas.

To Messrs. W. Paul, Waltham Cross, for Roses and *Bougainvillea glabra Sanderiana*.

To Messrs. Jas. Veitch, Chelsea, for *Pæonies* and *Iris*es.

To Messrs. F. Cant, Colchester, for decorative Roses.

To Messrs. Cooling, Bath, for decorative Roses.

#### *Silver Banksian Medal.*

To Messrs. Barr, Covent Garden, for hardy flowers.

To Mr. M. Richard, Christchurch, Hants, for hardy flowers.

To Messrs. Paul, Cheshunt, for decorative Roses and hardy flowering shrubs.

To Messrs. Cannell, Swanley, for hybrid Aquilegias.

To Messrs. Ware, Feltham, for hardy flowers.

To Mr. B. R. Cant, Colchester, for decorative Roses.

To Messrs. Wallace, Colchester, for hardy flowers.



FIG. 65.—*IRIS PARADOXA*. (*Journal of Horticulture*.)

*Bronze Banksian Medal.*

To Lord Gerard, Eastwell Park, Kent (gr. Mr. H. Walters), for Roses and Carnations.

To Mr. Anthony Waterer, Woking, for Rhododendrons and Acacias.

To Mr. V. N. Gauntlett, Green Lane, Redruth, for flowering shrubs and Bamboos.

*First-class Certificate.*

To *Iris paradoxa* (votes, unanimous), from Mr. C. G. Van Tubergen, jun., Haarlem. This is a bulbous *Iris*, grows about 8 inches high, and bears large beautifully marked flowers. The standards are broad, netted with mauve on a white ground; falls deep velvety black. It is a choice plant for the rock-garden. (Fig. 65.)

**Award of Merit.**

To *Iris Urmienne* (votes, 12 for), from Mr. C. G. Van Tubergen, jun. A charming new species from Urmiah, belonging to the bulbous section. It is dwarf, with large sulphur-yellow flowers blotched with deep yellow on the centre of the falls. The leaves are long and narrow.

To *Anchusa italica grandiflora* (votes, unanimous), from Mrs. Bulteel, Sefton Park, Slough. The flowers are somewhat larger than the type.

To *Delphinium* 'Queen of Huish' (votes, 8 for, 6 against), from Messrs. Kelway, Langport, Somerset. A moderately free-flowering variety with large semi-double deep blue flowers with a dark centre.

To *Pæony* 'Eastern Queen' (votes, unanimous), from Messrs. Wallace, Colchester. A wonderfully pretty single *Pæony*, quite distinct, with broad, substantial rose-purple petals and a prominent cluster of petaloid stamens in the centre.

To *Heuchera micrantha rosea* (votes, 18 for), from Messrs. Wallace. This differs from the type in having brownish-red flowers instead of white. The panicles are also larger and the stems bright red.

To *Eremurus Warei* (votes, 14 for), from Messrs. Ware, Feltham. Introduced from the mountains of Central Asia, and supposed to be a natural hybrid between *E. Bungei* (bright yellow flowers) and *E. Algæ robusta* (pink flowers). The small orange-shaded blossoms of *E. Warei* are borne on rather slender spikes, which are said to grow as much as 8 feet in height.

To *Campanula persicifolia Mørheimi* (votes, unanimous), from Messrs. Ware. A new variety of *Campanula* with large semi-double pure-white flowers borne in great abundance on erect slender stems 20 inches high. (Fig. 66.)

To *Iris germanica* 'Black Prince' (votes, unanimous), from Mr. A. Perry, Winchmore Hill. A lovely late-flowering fragrant *Iris* with large flowers; standards purplish blue; falls deep blackish purple with delicate white markings towards the base. (Fig. 67.)

To *Geranium sanguineum album* (votes, 16 for, 5 against), from Mr. A. Perry. This is a white-flowered form of the well-known type, and is a useful rock-garden plant.

**Other Exhibits.**

George Yeld, Esq., Clifton Cottage, York, sent flowers of *Iris* 'Arrac' and *Hemerocallis* 'Patience.'

From W. H. Myers, Esq., Swanmore Park, Bishop's Waltham (gr. Mr. E. Molyneux, V.M.H.), came flowers of *Anchusa italica* 'Florence Molyneux,' a vigorous form of the type.



FIG. 66.—*CAMPANULA PERSICIFOLIA* VAR. *MOERHEIMII*. (*Gardeners' Chronicle*.)

Messrs. Jackman, Woking, Surrey, sent a flowering plant of *Adenophora Potanini*.

Mr. H. Barnard, Southgate, sent *Petunia* 'Lady White.'

Mr. J. James, Kendal, Westmoreland, sent two *Pyrethrums*.



FIG. 67.—*IRIS GERMANICA* 'BLACK PRINCE.' (*The Garden.*)

From Mr. E. S. Towell, Hampton, came flowering plants of the Cactus-flowered *Pelargonium* 'Fire Dragon.'

Messrs. Heath, Cheltenham, sent Carnations.

Messrs. Williams, Upper Holloway, sent Carnations.

FLORAL COMMITTEE AT RICHMOND, JUNE 27, 1900.

W. MARSHALL, Esq., in the Chair, and twenty-four members present.

**Awards Recommended.**

*Gold Medal.*

To Messrs. Hill, Lower Edmonton, for stove and greenhouse Ferns.

To Messrs. Jas. Veitch, Chelsea, for Roses, Ivies, hardy flowers, and *Kalanchoë flammea*.

*Silver-gilt Flora Medal.*

To J. P. Morgan, Esq., Dover House, Roehampton (gr. Mr. J. F. McLeod), for Carnations and foliage plants.

To Messrs. Cutbush, Highgate, for foliage and flowering plants.

*Silver-gilt Banksian Medal.*

To Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.), for Water-lilies.

To Messrs. Peed, West Norwood, for Gloxinias, Caladiums, and Carnations.

*Silver Flora Medal.*

To Messrs. Carter, High Holborn, for Gloxinias and Petunias.

To Messrs. Kelway, Langport, for Delphiniums and Gaillardias.

To Messrs. Jackman, Woking, for herbaceous plants and Roses.

*Silver Banksian Medal.*

To Messrs. Barr, Covent Garden, for hardy flowers.

To Mr. Russell, Richmond, for hardy shrubs.

*First-class Certificate.*

To *Nymphæa gigantea* (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.). Although this lovely Australian *Nymphæa* was introduced to this country nearly fifty years ago, it is even now rare in gardens. It bears large pale blue flowers with a great central cluster of showy golden yellow stamens. It succeeds in a greenhouse temperature.

*Award of Merit.*

To Delphinium 'Sir George Newnes' (votes, unanimous), from Messrs. Kelway, Langport. A superb spike with large semi-double mazarine-blue flowers with a full white centre.

To *Iris Monnieri* (votes, 15 for), from Messrs. Barr, Covent Garden. Planted in good soil and close to water this species grows to a height of five feet and bears stout spikes of large fragrant lemon-yellow flowers, slightly veined with green.

To *Codiaeum* (Croton) 'Venus' (votes, 12 for), from Mr. Green, Crawford Street, W. A graceful variety, with long, narrow, twisted, arching golden yellow leaves marked with green.

**Other Exhibits.**

Col. Rous, Worstead House, Norfolk (gr. Mr. W. Chettleburgh), sent flowering sprays of Bougainvillea 'Maud Chettleburgh.'

Messrs. Jackman, Woking, sent flowers of Chrysanthemum segetum 'Gloria.' The Committee asked to see a plant.

Mr. Hayward, Fife Road, Kingston, sent some floral designs.

From Mr. Turner, Slough, came flowers of a new crimson Damask Rose. The Committee asked to see a plant.

Messrs. Sutton, Reading, sent a collection of Gloxinias.

Mr. Amos Perry, Winchmore Hill, sent a plant of Sedum kamschaticum, fol. var. The Committee asked to see a plant from the open ground.

Messrs. Cutbush, Highgate, sent a collection of topiary-work.

Mr. Jones, Lewisham, sent cut flowers.

Messrs. Phillips & Taylor, Bracknell, Berks, sent Carnations.

## FLORAL COMMITTEE, JULY 3, 1900.

W. MARSHALL, Esq., in the Chair, and thirteen members present.

**Awards Recommended :—***Silver-gilt Banksian Medal.*

To Messrs. W. Paul, Waltham Cross, for Roses.

*Silver Flora Medal.*

To Messrs. Kelway, Langport, for Delphiniums and Gaillardias.

To Mr. M. Prichard, Christchurch, for hardy flowers.

*Silver Banksian Medal.*

To Messrs. Cannell, Swanley, for Begonias.

To Messrs. Barr, Covent Garden, for hardy flowers.

To Messrs. Wallace, Colchester, for hardy flowers.

To Messrs. Ware, Feltham, for hardy flowers.

*Bronze Flora Medal.*

To the Duke of Rutland, Belvoir Castle, Grantham (gr. Mr. W. H. Divers), for hardy flowers.

To Percy Waterer, Esq., Fawkham, Kent, for Sweet Peas.

To Mr. Ladhams, Southampton, for hardy flowers.

*First-class Certificate.*

To *Magnolia macrophylla* (votes, 11 for), from Messrs. Jas. Veitch, Chelsea. A vigorous, hardy, deciduous tree, introduced from North America exactly a hundred years ago. Its leaves are very large, sometimes nearly 3 feet long and 10 inches broad, bright green above and glaucous below. The large fragrant cup-shaped flowers with stout petals are cream-white, stained with purple near the base. This *Magnolia* grows about 35 feet high, is rather shy-flowering in a young state, and dislikes cold, bleak situations.

*Award of Merit.*

To Heliotrope 'Picciola' (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.). Plant of bushy habit and moderately free-flowering; flower heads very large, about 6 inches across and very fragrant. The colour is dark heliotrope, with a blush-white eye.

To Delphinium 'Blanche Fitzmaurice' (votes, unanimous), from Messrs. Kelway, Langport. This produces a strong much-branched spike of fine semi-double mauve-coloured flowers shaded with blue. The centre is white.

**Other Exhibits.**

J. B. Fortescue, Esq., Dropmore, Maidenhead, sent hardy flowers.

J. T. Bennett-Poc, Esq., Homewood, Cheshunt (gr. Mr. J. Downes), sent flowers of Rose 'Duchess d'Auerstadt.'

Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.), sent Water-lilies.

Mrs. Bulteel, Sefton Park, Slough, sent Roses.

Messrs. Paul, Cheshunt, sent flowers of bedding H. T. Rose 'Lady Battersea.' The Committee asked to see a plant.

Mr. Gilbert, Dyke, Bourne, sent Sweet Peas.

C. B. Powell, Esq., Tunbridge Wells, sent Lilies.

From Messrs. Veitch, Chelsea, came Sweet Peas and sprays of flowering shrubs.

Mr. R. Dean, V.M.H., Faling, sent Stock 'Mauve Beauty.'

Mr. W. Warner, Hellands Road, Stevenage, sent flowers of Ivy-leaf Pelargonium 'Joseph Warner.' The Committee asked to see a plant.

Messrs. Jones, Shrewsbury, sent three new varieties of Sweet Peas. The Committee requested that seed might be sent to Chiswick.

Messrs. Boyes, Aylestone, Leicester, sent Carnation 'Lord Roberts.'

Messrs. Young, Cheshunt, sent a collection of new Pinks.

Messrs. Sutton, Reading, sent a group of Sweet William 'Pink Beauty.'

Mr. Turner, Slough, sent flowers of three seedling Roses. The Committee asked to see plants.

Messrs. Laxton, Bedford, sent Lily of the Valley 'Fortin's variety.'

Messrs. Brown, Stamford, sent Heliotrope 'Lord Roberts.'

Mrs. Soames, Daventry, sent Gloxinias.

Messrs. W. Paul, Waltham Cross, sent flowers of three vars. of Roses. The Committee asked to see plants.

ROSE SHOW, JULY 8, 1900.

JUDGES.

OPEN CLASSES.—Rev. A. Foster-Melliar, Rev. J. H. Pemberton, Mr. O. G. Orpen.

AMATEUR CLASSES.—Mr. G. Paul, Mr. J. D. Pawle, Mr. C. E. Cant.

GARDEN ROSES.—Mr. F. Mawley, Mr. A. Paul, Mr. G. W. Cook.

## MIXED VARIETIES.

**Class 1.**—Twenty-four Single Trusses, distinct. (Open.)

First Prize, £3; Second, £2.

1. Messrs. Prior, Colchester.
2. Mr. B. R. Cant, Colchester.

**Class 2.**—Eighteen Single Trusses, distinct. (Amateurs.)

First Prize, £3; Second, £2.

1. Mrs. Haywood, Woodhatch, Reigate (gr. Mr. C. J. Salter).
2. Rev. J. H. Pemberton, Havering-atte-Bower, Essex.

**Class 3.**—Eighteen Single Trusses, distinct. (Open.)

First Prize, £2; Second, £1. 10s.

1. Mr. C. Turner, Slough.
2. Messrs. Cooling, Bath.

**Class 4.**—Twelve Single Trusses, distinct. (Amateurs.)

First Prize, £2; Second, £1.

1. G. W. Cook, Esq., The Briars, Torrington Park, N. Finchley.
- Equal { Rev. A. Foster-Melliar.
- Second { H. P. Landon, Esq., Shenfield, Brentwood.

**Class 5.**—Six Single Trusses, distinct. (Amateurs.)

First Prize, £1; Second, 15s.

1. Miss Beatrice H. Langton, Raymead, Hendon.
2. R. Cook, Esq., Woodthorpe, Stonebridge Park, N.W.

**Class 6.**—Nine Single Trusses of any one variety of H.P., H.T., or H.B. (Amateurs.)

First Prize, £1; Second, 15s.

1. Mrs. Haywood (gr. Mr. C. J. Salter).
2. P. G. C. Burnard, Esq., Hill Grange, Reigate (gr. Mr. Humphrey).

**Class 7.**—Six Single Trusses of any one variety of H.P., H.T., or H.B. (Amateurs.)

First Prize, 15s.; Second, 10s.

1. G. W. Cook, Esq.
2. E. M. Bethune, Esq., Denne Park, Horsham.

## TEAS AND NOISETTES.

**Class 8.**—Eighteen Single Trusses, not less than twelve varieties or more than two Trusses of any one variety. (Amateurs.)

First Prize £3; Second, £1. 10s.

1. O. G. Orpen, Esq., West Bergholt, Colchester.
2. Rev. A. Foster-Melliar.

**Class 9.**—Eighteen Single Trusses, distinct. (Open.)

First Prize, £2. 10s.; Second, £1. 10s.

1. Mr. G. Prince, Oxford.
- 2 Messrs. Prior.

**Class 10.**—Twelve Single Trusses, not less than nine varieties or more than two Trusses of any one variety. (Amateurs.)

First Prize, £1. 10s.; Second, £1.

1. E. M. Bethune, Esq.
2. Alfred Tate, Esq., Downside, Leatherhead.

**Class 11.**—Six Single Trusses, not less than four varieties. (Amateurs.)

First Prize, £1; Second, 15s.

1. G. A. Hammond, Esq., Cambrian House, Burgess Hill, Sussex.
2. H. P. Landon, Esq.

**Class 12.**—Nine Single Trusses of any one variety. (Amateurs.)

First Prize, £1; Second, 15s.

1. O. G. Orpen, Esq.
2. F. W. Campion, Esq., Trumpets Hill Farm, Reigate (gr. Mr. J. Fitt).

**Class 13.**—Six Single Trusses of any one variety. (Amateurs.)

First Prize, £1; Second, 15s.

1. E. M. Bethune, Esq.
2. Miss B. H. Langton.

## GARDEN ROSES.

**Class 14.**—Thirty-six distinct varieties, not less than three Trusses of each. (Open.) Space occupied by exhibit not to exceed 10 feet by 8 feet.

First Prize, £3; Second, £2.

1. Messrs. Paul, Cheshunt.
- Equal { Messrs. Cooling.
- Second { Messrs. Frank Cant.

**Class 15.**—Eighteen distinct varieties, not less than three Trusses of each. (Amateurs.)

First Prize, £1. 10s.; Second, £1.

1. Alfred Tate, Esq.
2. Rev. J. H. Pemberton.

## MIXED VARIETIES IN VASES.

**Class 16.**—Nine distinct varieties (to include not more than four varieties of Teas or Noisettes), seven Trusses of each. All Roses mentioned in the National Rose Society's "Catalogue of Garden Roses" to be excluded

(space occupied by exhibit not to exceed 5 feet by 4 feet). Exhibits to be staged in nine vases or other receptacles instead of boxes. (Open.)

First Prize, £3; Second, £2; Third, £1.

1. Mr. B. R. Cant.
2. Messrs. Paul.
3. Messrs. Frank Cant.

Class 17.—Six distinct varieties (to include not more than three varieties of Teas or Noisettes), five Trusses of each. All Roses mentioned in the National Rose Society's "Catalogue of Garden Roses" to be excluded (space occupied by exhibit not to exceed 3 feet 6 inches by 4 feet). Exhibits to be staged in six vases or other receptacles instead of boxes. (Amateurs).

First Prize, £3; Second, £2; Third, £1.

1. O. G. Orpen, Esq.
2. Rev. J. H. Pemberton.
3. C. A. Pearson, Esq., Frensham Place, Farnham (gr. Mr. W. J. Prewett).

#### TEAS AND NOISETTES IN VASES.

Class 18.—Six distinct varieties, seven Trusses of each. All Roses mentioned in National Rose Society's Catalogue of Garden Roses to be excluded (space occupied by exhibit not to exceed 3 feet 6 inches by 4 feet). Exhibits to be staged in six vases or other receptacles instead of boxes. (Open.)

First Prize, £2. 10s.; Second, £1. 10s.; Third, £1.

1. Mr. B. R. Cant.
2. Mr. G. Prince.
3. Messrs. Frank Cant.

#### FLORAL COMMITTEE, JULY 17, 1900.

W. MARSHALL, Esq., in the Chair, and nineteen members present.

#### Awards Recommended:—

##### *Silver-gilt Flora Medal.*

To Lord Aldenham, Aldenham House, Elstree (gr. Mr. E. Beckett), for a collection of Codiaëums (Crotons) and magnificent hardy flowers.

##### *Silver-gilt Banksian Medal.*

To Messrs. W. Paul, Waltham Cross, for Roses.

To Mr. May, Upper Edmonton, for foliage plants.

##### *Silver Banksian Medal.*

To Messrs. Davis, Handford Hill, Yeovil, for Begonias.

To Messrs. Barr, Covent Garden, for hardy flowers.

To Messrs. Dobbie, Rothesay, for Violas.

To Messrs. Cutbush, Highgate, for Carnations.  
 To Messrs. Paul & Son, Cheshunt, for Roses and Phloxes.  
 To Mr. Perry, Winchmore Hill, for hardy flowers.  
 To Messrs. Wallace, Colchester, for Lilies, &c.  
 To Messrs. Jones, Shrewsbury, for Sweet Peas.

*Bronze Banksian Medal.*

To J. Key Allen, Esq., Bitterne Park, Southampton, for Sweet Peas.  
 To Allen Chandler, Esq., Haslemere, for Sweet Peas.  
 To Mr. W. Rumsey, Waltham Cross, for Roses.

*Award of Merit.*

To Border Carnation 'Major Harbord' (votes, 14 for, 1 against), from Lord Suffield, Gunton Park, Norwich (gr. Mr. W. Allan). The fragrant yellow flowers of this variety are large, of excellent shape, and borne on long substantial stems. The plant is of vigorous growth.

To *Nymphaea marliacea rosea* (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.), and Messrs. Jas. Veitch, Chelsea. In shape and size of flower it bears a close resemblance to *N. m. carnea*, but the colour is a much deeper shade of pink.

To *Nymphaea stellata pulcherrima* (votes, 15 for, 2 against), from Leopold de Rothschild, Esq. (gr. Mr. Jas. Hudson, V.M.H.). A charming Water-lily with blue flowers composed of long pointed petals, the sepals green, edged with blue and stained with purple.

To *Nymphaea Laydekeri fulgens* (votes, unanimous), from Messrs. Jas. Veitch. The deep crimson flowers of this variety are small, but of much substance, and the petals sharply pointed.

To Decorative Tea Rose 'Souvenir de Catherine Guillot' (votes, 12 for), from Messrs. W. Paul, Waltham Cross. A very bushy, compact, free-flowering Rose, with lovely salmon-pink flowers shading to orange and apricot.

To Border Carnation 'Bomba' (votes, 12 for, 3 against), from Mr. James Douglas, V.M.H., Edenside, Great Bookham. Large well-shaped light rose-coloured flowers, with broad round petals.

To Border Carnation 'Benbow' (votes, 8 for, 6 against), from Mr. Jas. Douglas, V.M.H. Beautifully formed soft salmon flowers, with a very delicate suffusion of pink.

To Border Carnation 'Midas' (votes, unanimous), from Mr. Jas. Douglas, V.M.H. Flowers of excellent shape and substance; the colour a distinct shade of orange scarlet.

To *Campanula carpatica* 'Riverslea' (votes, unanimous), from Mr. M. Prichard, Christchurch, Hants. A delightfully free-flowering variety of dwarf habit, with large almost flat purple-blue flowers.

To Annual Delphinium Larkspur 'Blue Butterfly' (votes, unanimous), from Messrs. Carter, 237 High Holborn. A compact bushy-habited variety, rarely exceeding 10 inches in height and exceedingly floriferous. The flowers are deep blue, and the long narrow leaves bright green.

**Other Exhibits.**

Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain), sent *Itea virginica*, an uncommon North American hardy shrub.

F. W. Moore, Esq., Upton House, Sompting, Worthing, sent a new Carnation.

The Marquis of Normanby, Mulgrave Castle, Whitby, Yorkshire (gr. Mr. J. Corbett), sent Sweet Peas. Seed was requested to be sent to Chiswick for trial.

From F. A. Bevan, Esq., Trent Park, New Barnet (gr. Mr. A. Ward), came beautiful flowering sprays of *Dipladenia prætoriensis*, supposed to be a cross between *D. Brearleyana* and *D. amabilis*.

C. F. Thompson, Esq., Penhill Close, Cardiff (gr. Mr. Mann), sent an unnamed Lily.

Messrs. Bird & Vallance, Downham, Norfolk, sent Carnation 'Mrs. Vallance.'

Messrs. Laing, Forest Hill, sent a new *Codiaeum* (*Croton*) named 'Gold-mine.'

Messrs. Dobbie, Rothesay, sent Sweet Peas. Seed was requested to be sent to Chiswick for trial.

Messrs. House, Westbury-on-Trym, Bristol, sent hardy *Chrysanthemums*.

From Mrs. Evans, Forde Abbey, Chard, Somerset (gr. Mr. J. Crook), came red and white *Oleanders*.

A. W. Porter, Esq., Holly Road, Waltham Cross, sent a new Carnation named 'Mrs. Porter.'

Messrs. Ware, Feltham, sent hardy flowers.

Mr. M. Prichard, Christchurch, Hants, sent hardy flowers.

Mr. Jas. Douglas, V.M.H., Great Bookham, Surrey, sent Border Carnations and Picotees.

Mr. G. Abbott, Knaresborough, sent a seedling *Marguerite*.

Mr. Warner, Stevenage, sent a new seedling Ivy-leaf *Pelargonium* named 'Joseph Warner.' The Committee asked to see this again in better condition.

Messrs. R. Veitch, Exeter, sent flowers of *Scabiosa caucasica magnifica*.

**FLORAL COMMITTEE AT CHISWICK, JULY 23, 1900.**

W. MARSHALL, Esq., in the Chair, and seven members present.

**Awards Recommended:—**

*Highly Commended* (× × ×).

**SWEET PEAS.**

Navy Blue

Gorgeous

Maid of Honour

Stella Morse

Ramona

Lottie Hutchins

A descriptive report will appear at the end of the season.

*Commended.*

West's Patent Grip Stake (votes, unanimous), from the Leeds Orchid Company, Roundhay, Leeds. This is a very handy, inexpensive, and

neat metal stake, well adapted for supporting Carnations, &c. Towards the bottom there is a small loop, which acts as a holdfast when pressed into the soil, and prevents it from being blown over in windy weather. At the top there is a coil, in which shoots may be placed with safety, thus doing away with the trouble and bother of tying. In the middle of the stake (or at intervals) clips made of thin lead may be placed to keep the main growths in position.

FLORAL COMMITTEE, JULY 31, 1900.

W. MARSHALL, Esq., in the Chair, and sixteen members present.

**Awards Recommended :—**

*Silver-gilt Flora Medal.*

To Messrs. Hill, Lower Edmonton, for specimen Ferns.

*Silver-gilt Banksian Medal.*

To Mr. May, Upper Edmonton, for *Campanula isophylla* Mayi.

To Messrs. Kelway, Langport, for *Gladioli*.

*Silver Flora Medal.*

To Messrs. Jones, Shrewsbury, for Sweet Peas.

To Messrs. W. Paul, Waltham Cross, for Phloxes and Yuccas.

To Messrs. Wills & Segar, South Kensington, for Alocasias.

To Messrs. Ware, Feltham, for Begonias.

To Messrs. Webb & Brand, Saffron Walden, for Hollyhocks.

*Silver Banksian Medal.*

To Welbore Ellis, Esq., Hazelbourne, Dorking (gr. Mr. W. Barrell), for a group of *Exacum macranthum*.

To Lord Hillingdon, Hillingdon Court, Uxbridge (gr. Mr. A. Allan), for Carnations and hardy flowers.

To Mr. Perry, Winchmore Hill, for hardy flowers.

To Messrs. Cutbush, Highgate, for Ivies.

To Messrs. Barr, Covent Garden, for herbaceous flowers and Water-lilies.

*Bronze Banksian Medal.*

To Messrs. Young, Stevenage, for hardy flowers.

*First-class Certificate.*

To *Nymphaea marliacea rubro-punctata* (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.). A very handsome Water-lily, with large rosy-purple flowers, speckled and tipped with silvery pink.

To *Hedychium* 'F. W. Moore' (votes, unanimous), from F. W. Moore, Esq., V.M.H., Glasnevin, Dublin. This was stated to be a cross between *H. coronarium* and *H. coccineum*. It produces a grand spike o

deliciously scented amber-yellow flowers blotched with orange-yellow at the base of the segments.

#### *Award of Merit.*

To *Nymphæa sanguinea* (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.). A variety with medium-sized flowers with rather broad deep-red petals shading to purple. The stamens are golden yellow.

To Double Begonia 'Mrs. Andrew Tweedie' (votes, unanimous), from Messrs. Ware, Feltham. A remarkably fine variety with large white 'amelia-like' flowers, touched with greenish yellow in the centre. The petals are broad and very substantial.

To Double Begonia 'S. T. Wright' (votes, 14 for, 1 against), from Messrs. Ware. Medium-sized, excellently shaped flowers of a rich apricot suffused with orange.

To strain of Pentstemons (votes, unanimous), from Messrs. Dobbie, Rothesay. A very fine strain with large variously coloured flowers. The plants are of sturdy habit and very free-flowering.

#### **Other Exhibits.**

The Duchess of Westminster, Chesham, Bucks (gr. Mr. Melville), sent Carnations.

J. H. Bushby, Esq., Wormley Bury, Wormley, sent flowering shoots of *Catalpa syringifolia*. A very handsome, hardy, deciduous tree, well adapted for planting in and about towns.

J. T. Bennett-Poe, Esq., Homewood, Cheshunt (gr. Mr. Downes), sent *Lobelia 'Ibis'*.

A. Mott, Esq., Scotswood, Sunningdale, sent Carnation 'Lilian May.'

Mrs. M. A. Banger, The Elms, Southwick, Brighton, sent *Lathyrus 'Maggie Banger'*, a form of *L. delicata*.

Lord Suffield, Gunton Park, Norwich (gr. Mr. W. Allan), sent Carnation 'Major Harbord.'

Leopold de Rothschild, Esq., Acton (gr. Mr. James Hudson, V.M.H.), sent flowers of *Nymphæa stellata* grown from seed only sown in February 1900.

Messrs. Bunyard, Maidstone, sent flowers of *Stanleya pinnata*, an uncommon hardy perennial from Colorado.

From Mr. E. Jenkins, Hampton Hill, came a large flowering branch of *Euonymus japonicus*.

Messrs. Paul, Cheshunt, sent *Amorpha canescens*, a hardy shrub with an abundance of long slender racemes of deep blue flowers.

Mr. F. C. Fowle, Teignmouth, Devon, sent Border Carnations.

Messrs. R. Veitch, Exeter, sent herbaceous plants and hardy shrubs.

From Mr. James Douglas, V.M.H., Edenside, Great Bookham, came a group of Border Carnations.

Messrs. Wallace, Kilnfield Gardens, Colchester, sent hardy flowers.

Messrs. James Veitch, Chelsea, sent sprays of hardy flowering shrubs.

Mr. W. Treseder, Cardiff, sent a seedling *Echinops* named 'Treseder var.'

From Messrs. Laing, Forest Hill, came a group of *Streptocarpus*.

FLORAL COMMITTEE, AUGUST 14, 1900.

W. MARSHALL, Esq., in the Chair, and sixteen members present.

**Awards Recommended :—**

*Silver-gilt Banksian Medal.*

To Mr. Mortimer, Farnham, Surrey, for Cactus, Show and Fancy Dahlias.

To Messrs. Kelway, Langport, for Gladioli.

*Silver Flora Medal.*

To Messrs. Cannell, Swanley, for Asters.

To Messrs. Wallace, Colchester, for hardy flowers.

*Silver Banksian Medal.*

To Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain), for hybrid Gladioli.

To Messrs. Frank Cant, Colchester, for garden Roses.

To Mr. H. B. May, Upper Edmonton, for *Campanula isophylla* Mayi.

*Bronze Flora Medal.*

To Mr. F. Davis, Woollashill, Pershore, for double Begonias.

*Bronze Banksian Medal.*

To Miss Henderson, Rosebank, Wick, N.B. (gr. Mr. D. Maclean), for hardy flowers and Sweet Peas.

*First-class Certificate.*

To *Nepenthes* 'Sir William T. Thiselton-Dyer' (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. This remarkably handsome hybrid was raised from seed sown in the spring of 1897, and is the result of crossing *N. mixta* with *N. Dicksoniana*. It is intermediate in character between its parents, and produces enormous pitchers quite 12 inches long and nearly 5 inches broad at the widest part; bright green, heavily blotched and mottled with brown and deep crimson. The broad glossy green rims are heavily shaded with mahogany-brown and crimson, and the bold pale-green lid is freely spotted with crimson.

*Award of Merit.*

To *Thalictrum Chelidonii* (votes, 9 for), from the Marchioness of Breadalbane, Taymouth Castle, N.B. (gr. Mr. W. Wright). A new or very rare herbaceous plant introduced from the temperate Himalayas, where it occurs at an elevation of from 6,000 to 10,000 feet. It bears some resemblance to *T. Delavayi*, which is also very rare and exceedingly difficult to grow satisfactorily. *T. Chelidonii* is dwarf, quite hardy, floriferous, and well adapted for the rock garden. It is of graceful habit, with much-divided pale green leaves, glaucous on the undersides, and bears panicles of dainty, rosy-mauve campanulate flowers with prominent yellow stamens.

To *Gladiolus* 'Mrs. Wood' (votes, 10 for, 4 against), from Messrs. Kelway, Langport. A rather small spike with average-sized purplish-crimson flowers shading to deep crimson and violet in the throat.

### Other Exhibits.

Miss E. Armitage, Dadnor, Ross, sent a seedling *Gypsophila* named 'The Pearl,' raised from *G. paniculata* crossed with (*G. elegans*).

Lady Ashburton, Alresford, Hants, sent a *Carnation*.

T. Cubitt, Esq., Eden Hall, Edenbridge, sent *Carnation* 'Mapletreuse.'

From J. T. Bennett-Poë, Esq., Homewood, Cheshunt (gr. Mr. J. Downes), came some well-flowered plants of *Browallia speciosa* major.

Mr. Cook, Streatham, sent flowers of *Picotée* 'Annie.'

Mr. Piper, Uckfield, Sussex, sent *Tea Rose* 'Sunrise.'

Mr. R. T. Kerslake, Henbury, Bristol, sent a seedling *Hollyhock*.

From Messrs. Dobbie, Rothesay, came a group of *Marigolds*.

Messrs. Thyne & Paton, Downfield, Dundee, sent a new perpetual tree *Carnation*.

Mr. S. Mortimer, Farnham, sent flowers of three new *Cactus Dahlias*. The Committee requested that plants might be sent to Chiswick.

Messrs. Looymans & Zonen, Oudenbosch (Holland), sent a plant of *Aralia* (*Dimorphanthus*) *elata* fol. *argentea marginata*, a hardy shrub with attractive foliage.

Mr. R. Walter, Rothwell, sent a seedling *Carnation*.

### FLORAL COMMITTEE, AUGUST 28, 1900.

GEORGE PAUL, Esq., V.M.H., in the Chair, and fifteen members present, with MM. Maurice L. de Vilmorin and Jules Margottin (visitors).

### Awards Recommended :—

#### *Silver-gilt Flora Medal.*

To Messrs. Vilmorin and Andrieux, Paris, for *Gladioli*.

#### *Silver-gilt Banksian Medal.*

To Messrs. Kelway, Langport, for *Gladioli*.

#### *Silver Banksian Medal.*

To Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain), for *Gladioli*.

To Messrs. Barr, Covent Garden, for hardy flowers.

To Messrs. Peed, West Norwood, for *Caladiums*.

To Messrs. Jas. Veitch, Chelsea, for greenhouse *Rhododendrons*.

To Messrs. Frank Cant, Colchester, for *Roses*.

To Messrs. Cannell, Swanley, for annuals.

To Mr. M. Prichard, Christchurch, Hants, for hardy flowers.

To Messrs. Paul & Son, Cheshunt, for *Roses*.

To Messrs. Ware, Tottenham, for hardy flowers.

*First-class Certificate.*

To *Platycodon grandiflorum* semi-duplex (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain). A grand variety of upright growth, with bright green lance-shaped leaves and large dark blue semi-double flowers.

*Award of Merit.*

To *Gladiolus* 'Jules Toussaint' (votes, 8 for), from Sir Trevor Lawrence, Bart. (gr. Mr. W. Bain). Large purple flowers shaded with deeper purple in the throat.

To *Gladiolus* 'Ocean' (votes, 7 for), from Sir Trevor Lawrence, Bart. (gr. Mr. W. Bain). A distinct variety, with bluish lilac-coloured flowers passing to white, and blotched with purple in the throat.

To *Glyceria aquatica foliis variegatis* (votes, 10 for), from Messrs. Paul & Son, Cheshunt. A tall-growing Grass, with silver variegated arching leaves and a pretty inflorescence. It loves a moist soil, and is well adapted for planting by lake or pond side.

To *Gypsophila repens monstrosa* (votes, unanimous), from Mr. M. Prichard, Christchurch, Hants. This variety is very much stronger in growth than the type, and the white flowers are also larger and borne in dense panicles with great freedom.

To *Gladiolus* 'Sir Evelyn Wood' (votes, 7 for, 4 against), from Messrs. Kelway, Langport. Beautifully shaped crimson flowers splashed with maroon.

**Other Exhibits.**

John Mackrell, Esq., High Trees, Clapham Common, sent *Medicago echinus*, the 'Calvary Clover,' a dwarf trailing plant with peculiar brown seed pods.

The Countess of Lonsdale, Lowther Castle, Penrith (gr. Mr. F. Clarke), sent flowers of a Cactus *Dahlia* grown from tubers brought from Darjeeling.

Messrs. Wills & Segar, South Kensington, sent a well-coloured plant of *Ananassa sativa variegata*.

Mr. C. Turner, Slough, sent Cactus and Pompon Dahlias.

Messrs. Cheal, Crawley, sent Cactus Dahlias. The Committee asked to see them again without wires.

Messrs. Wells, Redhill, Surrey, sent Chrysanthemums.

Messrs. Jackman, Woking, sent hardy plants.

Messrs. Williams, Upper Holloway, sent Dahlias.

Mr. G. St. Pierre Harris, Orpington, sent Dahlias.

FLORAL COMMITTEE, SEPTEMBER 11, 1900.

W. MARSHALL, Esq., in the Chair, and twenty members present.

**Awards Recommended :—**

*Gold Medal.*

To Messrs. Burrell, Cambridge, for a magnificent collection of Gladioli.

*Silver-gilt Flora Medal.*

To Messrs. Cannell, Swanley, for Cannas.

*Silver-gilt Banksian Medal.*

To Mr. Prince, Oxford, for Roses.

To Messrs. Cheal, Crawley, for Dahlias.

To Mr. Turner, Slough, for Roses.

*Silver Flora Medal.*

To Mr. Perry, Winchmore Hill, for hardy flowers.

To Messrs. Cooling, Bath, for Roses.

To Mr. J. H. Witty, Nunhead Cemetery, S.E., for Chrysanthemums.

*Silver Banksian Medal.*

To Messrs. Brown, Stamford, for Sweet Peas.

To Messrs. Barr, Covent Garden, for Gladioli and hardy flowers.

To Mr. Jones, Lewisham, for Begonias and Heliotropes.

To Messrs. W. Paul, Waltham Cross, for Salvias and Roses.

To Messrs. Frank Cant, Colchester, for Roses.

*Bronze Flora Medal.*

To Messrs. Ware, Feltham, for hardy flowers.

To Messrs. Paul & Son, Cheshunt, for Roses.

To Messrs. Harrison, Leicester, for Sweet Peas.

**Award of Merit.**

To *Anemone japonica* 'Mont Rose' (votes, unanimous), from Messrs. Paul, Cheshunt. A delightful variety of the Japanese Windflower, with large semi-double pale pink flowers with a prominent central cluster of golden-yellow stamens. It is very floriferous, and the flowers are borne on long stiff stems well above the foliage.

To *Heliotrope* 'Dr. Jeulin' (votes, unanimous), from Mr. H. J. Jones, Lewisham. A bushy-habited variety with dense corymbs of mauve-coloured fragrant flowers with a conspicuous white eye.

To *Gladiolus* 'Althæa' (votes, unanimous), from Messrs. Burrell, Cambridge. A large spike of beautifully formed salmon-coloured flowers streaked with crimson. The basal portion of the lower segment is purple and crimson.

To *Gladiolus* 'Delicata' (votes, 14 for), from Messrs. Burrell. The handsome flowers of this variety are borne on immense spikes, delicate pink shaded with cream white and irregularly bordered with bright purple.

To *Cactus Dahlia* 'Artus' (votes, 7 for, 6 against), from Messrs. Burrell. Large excellently shaped flowers, with orange-red petals shaded with purple.

To *Cactus Dahlia* 'Rosine' (votes, unanimous), from Messrs. Burrell. A remarkably pretty variety with large rosy-purple flowers shaded and tipped with rose.

To *Cactus Dahlia* 'Lyric' (votes, 7 for, 6 against), from Messrs.

Burrell. Medium-sized, clear scarlet flowers, the basal portion of petals heavily suffused with yellow.

To Cactus Dahlia 'J. W. Wilkinson' (votes, unanimous), from Messrs. Burrell. An exquisite variety with narrow petals, rosy scarlet tipped with purple.

To Cactus Dahlia 'Vesta' (votes, unanimous), from Messrs. Burrell. Lovely rose-pink flowers with a delicate pink centre. This is an improvement on the well-known 'Delicata.'

To Cactus Dahlia 'Imperator' (votes, unanimous), from Messrs. Burrell. Beautifully shaped deep scarlet flowers with long narrow petals.

To Cactus Dahlia 'Dinorah' (votes, unanimous), from Messrs. Burrell. A distinct variety, with large orange-coloured flowers with a deeper centre.

To Cactus Dahlia 'Galliard' (votes, unanimous), from Messrs. Burrell. An excellent variety with narrow bright scarlet petals.

To Cactus Dahlia 'Jealousy' (votes, 9 for, 5 against), from Mr. J. Stredwick, St. Leonards. The beautifully formed canary-yellow flowers with long pointed petals are borne well above the foliage.

To Cactus Dahlia 'Eclipse' (votes, 9 for, 3 against), from Mr. J. Stredwick, St. Leonards. This variety produces larger flowers than the last-named, and the colour is paler and the petals longer and narrower.

To Pompon Dahlia 'Galatea' (votes, 13 for, 1 against), from Mr. C. Turner, Slough. A dainty variety with ruby-red flowers.

To Pompon Dahlia 'Zerlina' (votes, 9 for, 3 against), from Mr. C. Turner. Flowers deep crimson or maroon tipped with red.

To Pompon Dahlia 'Sybil' (votes, 10 for), from Mr. C. Turner. Lovely yellow flowers heavily tipped with orange red and crimson.

#### *Botanical Certificate.*

To Anthurium Bakeri (votes, 10 for, 1 against), from Messrs. Jas. Veitch, Chelsea. An uncommon South African species with long narrow dull green leaves, with a prominent midrib and long narrow spathes.

#### **Other Exhibits.**

Dr. Stocker, Avery Hill, Eltham, sent *Amaranthus caudatus*, 'Avery Hill var.'

H. J. Hope, Esq., Preston House, Basingstoke, sent flowers of Hollyhock 'Mrs. Hope.'

Mr. G. St. Pierre Harris, Orpington, sent four varieties of Show Dahlias.

From Messrs. Jas. Veitch, Chelsea, came a collection of *Gladiolus nanceianus*.

Messrs. Dobbie, Rothesay, sent Marigolds.

Messrs. Hender, Plymouth, sent flowers of *Petunia* 'Lady Audrey Buller.' The Committee asked to see a plant in flower.

Messrs. Peed, West Norwood, sent hardy flowers.

Mr. Piper, Uckfield, Sussex, sent Roses.

## FLORAL COMMITTEE AT CHISWICK, SEPTEMBER 21, 1900.

W. MARSHALL, Esq., in the Chair, and six members present.

**Awards Recommended :—***Highly Commended* (× × ×).

To the following Cactus Dahlias :—1 Exquisite, 2 Mary Service, 3 William Cuthbertson, 4 Night, 5 Magnificent, 6 Mrs. John Goddard, 7 Britannia, 8 King of Siam, 9 Alfred Vasey, 10 Crimson King, 11 Standard Bearer, 12 Profusion, 13 Salisbury White, 14 Countess of Lonsdale, 15 Ruby, 16 Dr. Jameson, 17 Austin Cannell, 18 Miss Finch.

To Pompon Dahlia 'Tommy Keith.'

A descriptive report on Dahlias will appear when the trial is completed.

## FLORAL COMMITTEE, SEPTEMBER 25, 1900.

W. MARSHALL, Esq., in the Chair, and fifteen members present.

**Awards Recommended :—***Gold Medal.*

To Messrs. Jas. Veitch, Chelsea, for Nepenthes, Sunflowers, and Tritomas.

*Silver-gilt Flora Medal.*

To Messrs. W. Paul, Waltham Cross, for Roses.

To Mr. J. Green, Dereham, for Dahlias.

*Silver-gilt Banksian Medal.*

To Mr. J. H. Witty, Nunhead Cemetery, for Chrysanthemums.

To Mr. Norman Davis, Framfield, Sussex, for Michaelmas Daisies.

*Silver Flora Medal.*

To Mr. West, Tower Hill, Brentwood, for Dahlias.

To Messrs. Paul & Son, Cheshunt, for hardy flowers and Roses.

To Mr. Jones, Lewisham, for Begonias and Michaelmas Daisies.

To Mr. A. Perry, Winchmore Hill, for hardy flowers.

*Silver Banksian Medal.*

To Mr. B. R. Cant, Colchester, for Roses.

To Mr. May, Upper Edmonton, for a group of Begonia 'Mrs. Leopold de Rothschild.'

To Mr. Jas. Stredwick, St. Leonards, for Dahlias.

To Mr. John Russell, Richmond, for Bamboos, &c.

To Mr. M. V. Seale, Sevenoaks, for Dahlias.

*Bronze Banksian Medal.*

To Messrs. Barr, Covent Garden, for hardy flowers.

To Messrs. Wells, Redhill, for early flowering Chrysanthemums.

To Messrs. Keynes Williams, Salisbury, for Cactus Dahlias.

*First-class Certificate.*

To *Sternbergia macrantha* (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.). The exquisite flowers of this Asiatic *Sternbergia* are much larger than, and superior to, those of *S. lutea* major, and the colour is deep buttercup-yellow. It was introduced to this country in the early part of the present century, is quite hardy and a splendid border bulb, the flowers of which are produced before the leaves. It delights in a rich deep soil and a sheltered position.

To *Colchicum speciosum album* (votes, unanimous), from Leopold de Rothschild, Esq. (gr. Mr. Jas. Hudson, V.M.H.). Most lovely pure white, globular, crocus-like flowers with prominent yellow stamens. A valuable and very rare autumn-flowering hardy bulb, succeeding well on a warm, dry border. A most valuable acquisition.

To *Nepenthes Chelsoni excellens* (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. The exceedingly handsome pitchers of this new variety raised from the original *N. Chelsoni* ♂ and *N. Rafflesiana* ♀ are short and broad, rich green, heavily streaked and mottled with brown and crimson. The green rim is freely streaked with mahogany brown, and the bold, pale green lid is profusely mottled with brown.

*Award of Merit.*

To *Tamarix Kashgarica* (votes, 7 for, 2 against), from F. W. Moore, Esq., V.M.H., Glasnevin, Dublin. A distinct and ornamental, sturdy-growing *Tamarix* from Western Asia, with large spikes of small rosy-purple flowers.

To Tea Rose 'Mrs. B. R. Cant' (votes, unanimous), from Mr. B. R. Cant, Colchester. This is the result of crossing 'Papa Gontier' with 'Isabella Sprunt.' It is an exceedingly free and continuous bloomer, the growth strong and branching with sweet-scented flowers of a lovely shade of rose-pink.

To Cactus Dahlia 'Lord Roberts' (votes, 10 for), from Mr. Jas. Stredwick, St. Leonards. Flowers of excellent shape, with long, pointed pale straw-coloured petals.

To Cactus Dahlia 'General French' (votes, 9 for, 1 against), from Mr. Jas. Stredwick. Beautifully shaped, bright orange-coloured flowers with sharply pointed petals.

To Cactus Dahlia 'Mrs. Jowett' (votes, 7 for, 4 against), from Mr. Jas. Stredwick. A pleasing variety with apricot yellow petals margined with orange.

To Cactus Dahlia 'Prince of Yellows' (votes, 11 for), from Mr. Mortimer, Farnham. Lovely yellow flowers with incurving petals.

To Cactus Dahlia 'Kathleen' (votes, 9 for), from F. W. Sharp, Esq., Great Martins, Twyford, Berks. Large, rich orange-coloured flowers with pointed incurving petals.

To Pompon Dahlia 'Thalia' (votes, 12 for), from Mr. M. V. Seale, Sevenoaks. Lovely rosy-mauve flowers with a white centre.

To Pompon Dahlia 'Doris' (votes, 11 for, 1 against), from Mr. M. V. Seale. Small pale rose-coloured flowers with a light centre.

To Show Dahlia 'Gracchus' (votes, 6 for, 1 against), from Mr. Turner, Slough. Large shapely yellow flowers flushed with orange.

To Single Dahlia 'Shamrock' (votes, 5 for, 4 against), from Messrs. Cheal, Crawley. Medium-sized rich crimson or maroon flowers tipped with rose.

To Pompon Cactus Dahlia 'Venus' (votes, 8 for, 2 against), from Messrs. Cheal. A very small Cactus-flowered variety with white incurving petals.

To Helianthus 'H. G. Moon' (votes, 7 for, 3 against), from Messrs. Barr, Covent Garden. This lovely single-flowered perennial Sunflower, raised from *H. latiflorus* and *H. multiflorus*, has broad, deep golden yellow ray florets with a high dark centre.

### Other Exhibits.

T. H. O. Pease, Esq., Skaigh, Okehampton, sent Cactus Dahlias.

From Messrs. Cheal, Crawley, came a small collection of ornamental Crab Apples.

Mrs. Evans, Forde Abbey, Chard (gr. Mr. J. Crook), sent flowers of *Nerine Fothergilli* and *Calceolaria amplexicaulis*.

Messrs. Johnson, Boston, sent a collection of Sweet Peas, which were excellent for the time of year.

Messrs. House, Westbury-on-Trym, sent Phloxes and Pentstemons.

From Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.), came a choice group of uncommon autumn flowers.

Mr. W. J. Godfrey, Exmouth, sent Chrysanthemums.

Messrs. Jas. Veitch, Chelsea, sent *Pteris Grevilleana* and *P. G. variegata*. The Committee asked to see these again.

Mr. Curtis, Brentford, sent Chrysanthemum 'Ralph Curtis,' a cream-white sport from 'Mad. Marie Masse.'

Messrs. Clibran, Altrincham, sent *Celosias* and *Cockscombs*.

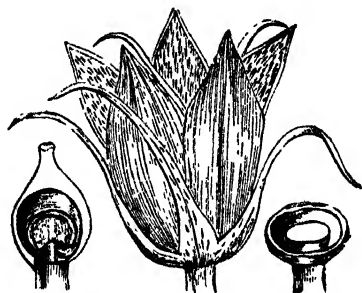
Mr. Humphries, Chippenham, sent two varieties of Cactus Dahlias.

Mr. M. Prichard, Christchurch, sent hardy flowers.

Mr. G. W. Piper, Uckfield, sent Tea Roses.

Mr. W. J. Burn, Cromer, sent two *Adiantums*.

Mr. J. Harvey Cox, Feltham, sent Dahlias.



## ORCHID COMMITTEE.

JANUARY 9, 1900.

HARRY J. VEITCH, Esq., in the Chair, and thirteen members present.

### Awards Recommended:—

#### *Silver Flora Medal.*

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a group of Orchids, in which were a large number of cut spikes of different species of *Phalænopsis*.

#### *Silver Banksian Medal.*

To R. W. Rickards, Esq., The Priory, Usk (gr. Mr. Murrell), for a group of *Odontoglossum Rossii majus* and other Orchids.

To Messrs. Hugh Low & Co., Enfield, for a group of Orchids.

#### *First-class Certificate.*

To *Cypripedium* × 'Sir R. Buller' (Lucie syn. *Smithi* × *insigne*) (votes, unanimous), from W. M. Appleton, Esq., Weston-super-Mare, a large flower, somewhat resembling *C.* × *Swinburnei magnificum*. Upper sepal green at the base, white above, with radiating dark chocolate purple lines; petals yellow, tinged with rose colour and blotched purple; lip yellow tinged with red. (Fig. 68.)

#### *Award of Merit.*

To *Lælia anceps* *Leeana* (votes, 9 for, 2 against), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers white, with dark lines at the base of the lip, the front and side lobes of which are tinged with rose colour.

To *Zygo-Colax* × *Wiganiana* (*Z. intermedium* × *C. jugosus*) (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). Sepals and petals green with red-brown bars; lip white, with violet markings.

To *Zygo-Colax* × *Leopardinus* 'Wigan's variety' (*Z. maxillare* *Gautieri* × *C. jugosus*) (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). Sepals and petals equal, emerald green, closely barred with brown; lip violet, darker at the base.

#### *Botanical Certificate.*

To *Mormodes Buccinator* *Rolfi*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers purplish red.

#### *Cultural Commendation.*

To Mr. Murrell, gr. to R. W. Rickards, Esq., The Priory, Usk, for a large plant of *Cypripedium bellatulum*, 'Usk Priory variety.'

**Other Exhibits.**

Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), showed some interesting hybrid *Calanthes* &c.

Norman C. Cookson, Esq., Wylam (gr. Mr. Wm. Murray), showed

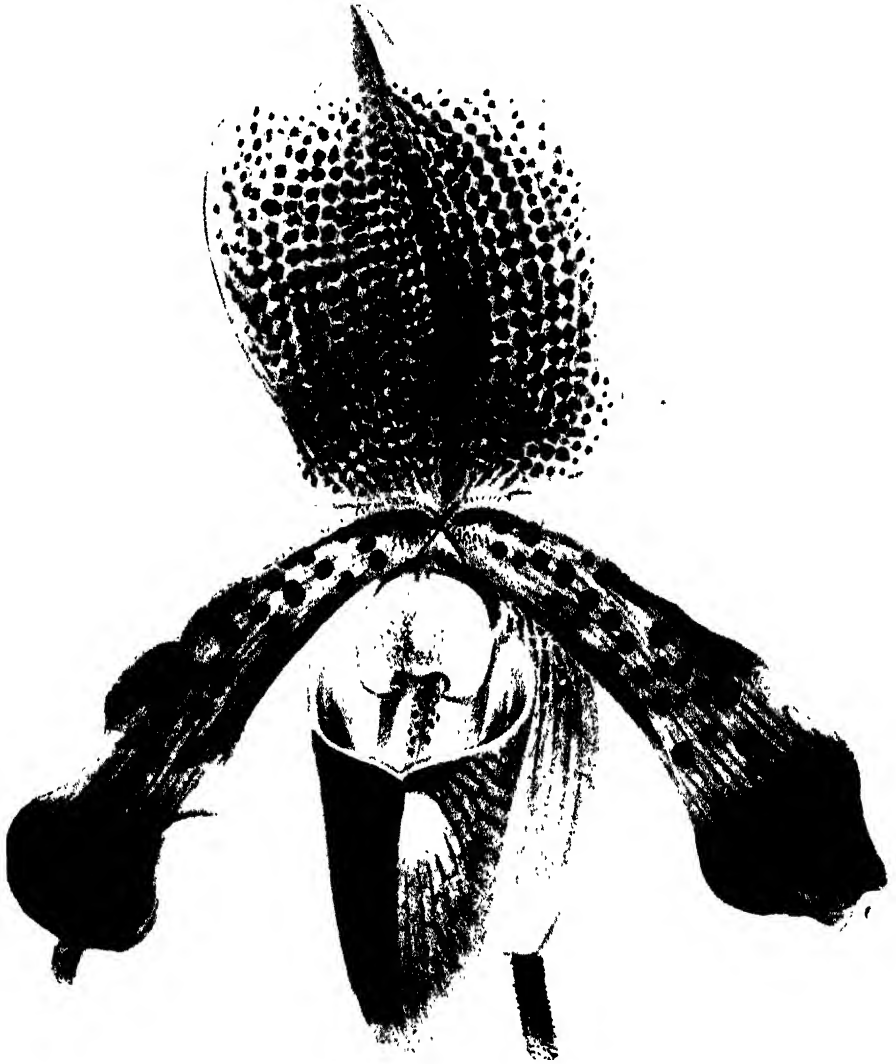


FIG. 68.—*CYPRIPEDIUM* 'SIR REDVERS BULLER.' (*Journal of Horticulture*.)

*Calanthe*  $\times$  *atrorubens* ('Wm. Murray' ♀ 'Oakwood Ruby' ♂), with flowers entirely of a bright purplish red.

Messrs. Linden, l'Horticole Coloniale, Brussels, showed *Cypripedium*  $\times$  *Gowerianum formosum* and other Orchids.

Messrs. B. S. Williams, Holloway, showed a group of hybrid *Cypripediums*.

J. T. Bennett-Poe, Esq. (gr. Mr. Downes), sent *Dendrobium spectabile*.

G. W. Law-Schofield, Esq. (gr. Mr. Shill), sent varieties of *Cypripedium* × *Leeanum*.

Sir Wm. Marriott (gr. Mr. Denny) showed *Sophro-Lælia* × *Marriottiana*.

Earl Brownlow, Ashridge (gr. Mr. R. Low), sent *Cypripedium* × *Leeanum*, with twenty-five flowers.

Captain Holford, Westonbirt (gr. Mr. A. Chapman), showed *Cypripediums*.

T. W. Swinburne, Esq., sent *Lælia Jongheana*.

#### ORCHID COMMITTEE, JANUARY 23, 1900.

J. GURNEY FOWLER, Esq., in the Chair, and fifteen members present.

#### Awards Recommended :—

##### *Silver-gilt Flora Medal.*

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a fine group of *Phalænopsis* and other Orchids.

##### *First-class Certificate.*

To *Cypripedium* × *Sanderiano-Curtisii* (*Sanderianum* ♂ *Curtisii* ♀) (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Wm. Murray). Upper sepal ovate acuminate, greenish white with chocolate lines ; petals formed like *C. Sanderianum*, whitish rose with dark purple spots : lip and staminode reddish rose. (Fig. 70.)

To *Epidendrum* × *Wallisio-ciliare superbum* (*Wallisii* × *ciliare*) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. A fine advance on previous varieties. Sepals and petals yellow ; lip white with purple lines in the centre. (Fig. 69.)

To *Phalænopsis* × *Schilleriano-Stuartiana* (*Schilleriana* × *Stuartiana*) (votes, unanimous), from Messrs. Hugh Low, Enfield. Flowers resembling a pale *P. Schilleriana*, and foliage like that species. (Fig. 71.)

##### *Award of Merit.*

To *Calanthe Regnierii hololeuca* (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White). A pure-white form without the usual purple blotch in the centre.

To *Lælio-Cattleya* × *callistoglossa* 'Princess of Wales' (*C. Warscewiczii* × *L. purpurata Russelliana*) (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). A fine form with rose-coloured flowers, the front of the lip being dark rose.

To *Cypripedium* × *Actæus langleyense* (*insigne Sanderi* ♂ × *Leeanum* ♀) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. Flowers resembling a light-coloured *C. × Leeanum* ; upper sepal white with a green base and a few purple markings ; lip and petals yellow.

To *Lælia* × 'Mrs. M. Gratrix' *superba* (*cinnabarina* × *Digbyana*) (votes, unanimous), from Messrs. Jas. Veitch. Flowers yellow ; lip fringed.





FIG. 69.—HYACINTHOIDEA WALLISII. (*The Garden.*)



To *Phalenopsis* × *intermedia* *Brymeriana* (rosea × 'Aphrodite') (votes, unanimous), from Messrs. Hugh Low, Enfield. Sepals and petals pale rose ; lip reddish crimson. (Fig. 73.)



FIG. 70.—*CYPRIPEDIUM* × *SANDERIANO-CURTISII*. (*Gardeners Chronicle*.)

To *Lælio-Cattleya* × 'Fanny Leon' (*L.-C.* × *exoniensis* × *C. labiata*) (votes, unanimous), from H. S. Leon, Esq., Bletchley (gr. Mr. A. Hislop). Sepals and petals clear rosy lilac; lip purplish crimson, with yellow and brown markings at the base. (Fig. 72.)

To *Lælio-Cattleya* × 'Sunray' (*L. cinnabarina* × *C. superba*) (votes, unanimous), from Messrs. Charlesworth, Bradford. Flowers bright copper-orange colour, with claret crimson lip.

To *Lælio-Cattleya* × *Charlesworthii* (*L. cinnabarina* ♀ *C. Dowiana aurea* ♂) (votes, unanimous), from Messrs. Charlesworth. Sepals and petals reddish orange; lip marked with purple.

*Botanical Certificate.*

To *Dendrobium Madonna*, from Messrs. F. Sander, St. Albans. Flowers in drooping racemes; white with purple markings on the edge of the labellum.

To *Tainia penangiana*, from Sir Trevor Lawrence, Bart. (gr. Mr.

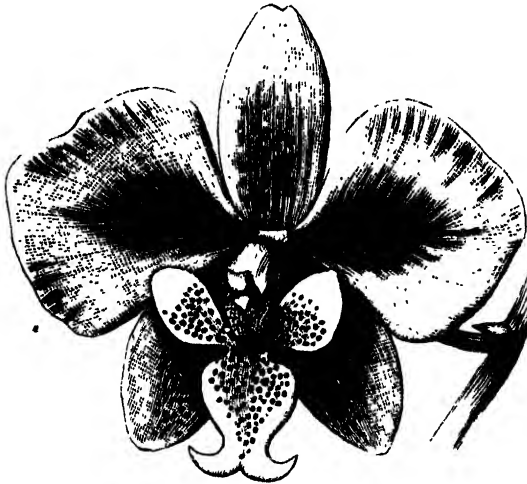


FIG. 71.— *PHALAENOPSIS SCHILLERIANO-STUARTIANA*. (*Journal of Horticulture*.)

W. H. White). Flowers on stout upright spikes; green tinged with brown.

To *Maxillaria leptosepala*, from Sir Trevor Lawrence, Bart. Flowers resembling a small *M. luteo-alba*; white tinged with pink and yellow.

To *Maxillaria arachnites*, from Sir Trevor Lawrence, Bart. Segments narrow and drooping; yellow.

*Cultural Commendation.*

To Mr. E. Hill, gr. to the Right Hon. Lord Rothschild, Tring Park, for *Odontoglossum crispum*, with a 3 ft. 6 in. three-branched spike bearing thirty-seven flowers. The plant had been grown at Tring for seventeen years

To Mr. Downes, gr. to J. T. Bennett-Poe, Esq., Cheshunt, for a fine *Lælia anceps* Sanderiana, with four spikes of flowers.





FIG. 72. LILIO-CATTELEYA 'FANNY LEON.' (*The Garden*.)





**Other Exhibits.**

Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), showed a fine group of Orchids.

Messrs. Jas. Veitch staged a good group of Orchids.

Messrs. Hugh Low showed *Cymbidium Tracyanum* and other Orchids.

Baron Sir H. Schröder (gr. Mr. H. Ballantine), sent *Odontoglossum* × *Wilckeanum Schröderianum*.

G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Morris), showed *Cypripedium* × *Beekmanii* &c.

Sir Wm. Marriott (gr. Mr. Denny) sent *Odontoglossum crispum castum*.



FIG. 73. *PHALAENOPSIS INTERMEDIA BRYMERIANA*. (*Gardeners' Magazine*.)

R. G. Thwaites, Esq., Streatham, sent *Dendrobium* × 'Galatea' (*moniliforme* × *Rolfeæ roseum*).

G. W. Law-Schofield, Esq. (gr. Mr. Shill), showed *Cypripedium* × *nitens albens*.

De B. Crawshay, Esq. (gr. Mr. S. Cooke), sent *Odontoglossum Rossii majus*.

#### ORCHID COMMITTEE, FEBRUARY 13, 1900.

J. GURNEY FOWLER, Esq., in the Chair, and fifteen members present.

#### **Awards Recommended:—**

##### *First-class Certificate.*

To *Odontoglossum crispum Mundianum* (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam, Northumberland (gr. Mr.

Wm. Murray). A finely blotched flower resembling *O. c.* 'Franz Masereel,' but superior to it. Flower surface almost covered with chestnut red blotches, the margin and intervening spaces being white tinted with rose, crest-yellow. (Fig. 74.)

To *Lælio-Cattleya* × 'Berthe Fournier,' var. *splendida* (L.-C. × *elegans* × *C. Dowiana aurea*) (votes, unanimous), from M. Chas. Maron, Brunoy, France. A far finer flower than the original. Sepals and petals bright rose, with a slight freckling of cream-white; lip rich ruby crimson, with narrow gold-coloured lines radiating from the base to the centre. (Fig. 75.)

*Botanical Certificate.*

To *Zygopetalum Murryanum*, from the Royal Botanic Gardens,

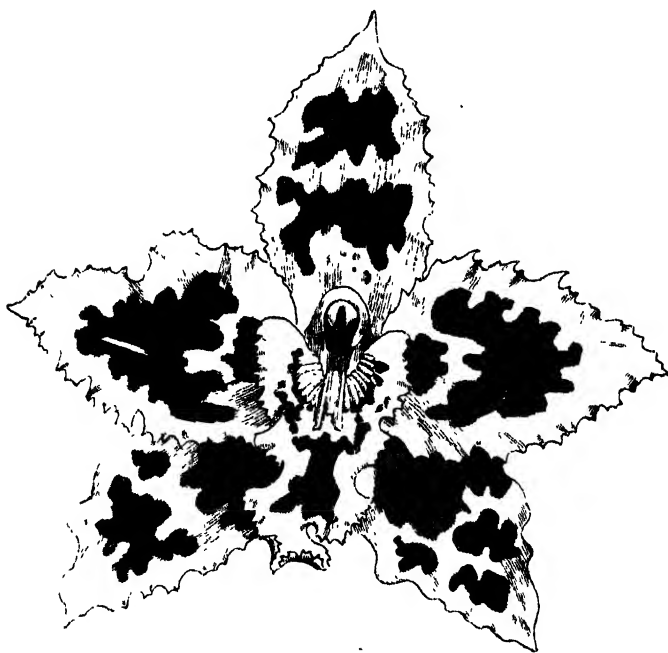


FIG. 74. *ODONTOGLOSSUM CRISPUM* 'MYNDIANUM.' (*Journal of Horticulture*.)

Glasnevin, Dublin. A singular Brazilian species with comparatively small pale green flowers with slight purple marking. Figured in "*Bot. Mag.*," t. 3674.

To *Dendrobium macrophyllum* *Richardi*, from C. J. Lucas, Esq., Warnham Court, Horsham (gr. Mr. Duncan). A pale green form with purple lines on the lip. Found in some gardens as *D. Richardianum*, but only a pale form of *D. macrophyllum* of Richard, native of Java.

**Other Exhibits.**

Norman C. Cookson, Esq. (gr. Mr. Wm. Murray), sent *Odontoglossum crispum* *Cooksoni* and varieties of hybrid *Phaio-Calanthe*.

Captain Holford, Westonbirt (gr. Mr. A. Chapman), showed varieties





FIG. 76.—LILIO-CATTLEYA 'BERTHE FOURNIER', VAR. SPLENDIDA. (*Gardener's Magazine*.)



of *Cypripedium* × 'Calypso,' *C.* × *nitens* 'Mons. de Curte' (fig. 76), *C.* × 'Cyris,' and *Cattleya* *Trianaei* 'Westonbirt variety.'

Walter Cobb, Esq. (gr. Mr. J. Howes), showed fine spikes of *Lælia anceps* 'Stella' and *L. a.* *Sanderiana*; also *Cypripedium* × *nitens* 'Bassano.'

Messrs. Heath, Cheltenham, sent a good pan of the white *Dendrobium barbatulum* &c.

R. Brooinan-White, Esq., Arddarroch, showed a collection of cut spikes of *Odontoglossums*.

Messrs. Linden, l'Horticole Coloniale, Brussels, sent *Odontoglossum* ×



FIG. 76.—HYBRID *CYPRIPEDIUM* 'MONS. DE CURTE.' (*The Garden.*)

*Ruckerianum rubiginosum*, *O. crispum* 'Goliath,' and *Cypripedium* × *Schusterianum* (*villosum* × *Hookerianum* *Volonteanum*).

J. Gurney Fowler, Esq. (gr. Mr. Davis), showed *Cattleya* × 'Miranda,' *C. Trianaei* 'Glebelands variety,' and two hybrid *Cypripediums*.

Frank A. Rehder, Esq., Gipsy Hill (gr. Mr. Norris), sent *Cypripedium* × 'Favarger' (*Charlesworthii* × *concinnum*).

M. Chas. Maron showed *Lælio-Cattleya* × *Ernestii pallida* (*L. flava* × *C. Percivaliana*).

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#### ORCHID COMMITTEE, FEBRUARY 27, 1900.

J. GURNEY FOWLER, Esq., in the Chair, and twenty-two members present.

#### Awards Recommended:—

*Silver-gilt Flora Medal.*

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White), for a fine group of Burford hybrid *Dendrobiums* and other Orchids.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a fine group of *Odontoglossums*, *Cattleyas*, &c.

*Silver Flora Medal.*

To W. Thompson, Esq., Walton Grange, Stone, Stafford (gr. Mr. W. Stevens), for a collection of rare Odontoglossums.

To Messrs. Jas. Veitch, Chelsea, for a fine group of Orchids, amongst which *Laelio-Cattleya callistoglossa splendens* (fig. 77) was very noticeable.

*Silver Banksian Medal.*

To Mr. Jas. Cypher, Cheltenham, for *Dendrobiums* in flower.



FIG. 77.—*LÆLIO-CATTELEYA CALLISTOGLOSSA SPLENDENS.* (*The Garden.*)

To Welbore S. Ellis, Esq., Hazelbourne, Dorking (gr. Mr. Barrell), for a group of Odontoglossums.

*First-class Certificate.*

To *Laelia* × ‘*Edissa*’ (anceps ♀ × purpurata ♂) (votes, unanimous), from Messrs. Jas. Veitch. A fine hybrid with flowers and growth nearer to *L. anceps* than to the other species used, though the flowers were much larger than *L. anceps*; sepals and petals pale lilac; front of lip claret purple. (Fig. 78.)

*Award of Merit.*

To *Cattleya Trianaei*, ‘*West Bank House var.*’ (votes, unanimous), from

J. Leemann, Esq., West Bank House, Heaton Mersey (gr. Mr. A. Edge). A fine form with some resemblance to *C. Warscewiczii*. Sepals and petals bright rose colour; base of lip purple with white lines; broad middle area rich orange; front lobe purplish crimson with fimbriated light rose margin.

To *Zygopetalum Balli*, Rolfe (votes 10 for, 6 against), from G. S. Ball, Esq., Wilmslow (gr. Mr. Gibbon). Flower formed like *Z. rostratum*; white, the sepals being tinged with rose-purple, and the petals and lip blotched with the same colour. (Fig. 79.)



FIG. 78.—*LÆLIA* 'EDISSA' (*L. ANCEPS* × *L. PURPURATA*). (*The Garden*.)

To *Odontoglossum* × *loochrisyense* 'Kimberley' (votes, unanimous). The best of the hybrids between *O. crispum* and *O. triumphans*. Flowers yellow with brown blotches.

To *Odontoglossum* × *Adrianæ* 'Lord Roberts' (votes, unanimous), from W. Thompson, Esq. (gr. Mr. W. Stevens). A pretty cream-white flower spotted with purple brown.

#### *Botanical Certificate.*

To *Dendrobium Jerdonianum*, from Sir Trevor Lawrence, Bart. (gr.

Mr. W. H. White). Flowers orange colour, segments narrow. A singular highland Indian species.

To *Dendrobium puniceum*, from Sir Trevor Lawrence, Bart. Flowers in clusters, pink.

To *Restrepia striata*, from R. I. Measures, Esq. (gr. Mr. H. J. Chapman). Resembling *R. antennifera*, but with yellow flowers striped with red brown.

*Cultural Commendation.*

To Mr. Thurgood, gr. to H. T. Pitt, Esq., Rosslyn, Stamford Hill, for a grand specimen of *Cymbidium* × *eburneo-Lowianum* with seven flower spikes fully expanded and two in bud.

To Mr. C. J. Salter, gr. to T. B. Haywood, Esq., Woodhatch, Reigate,

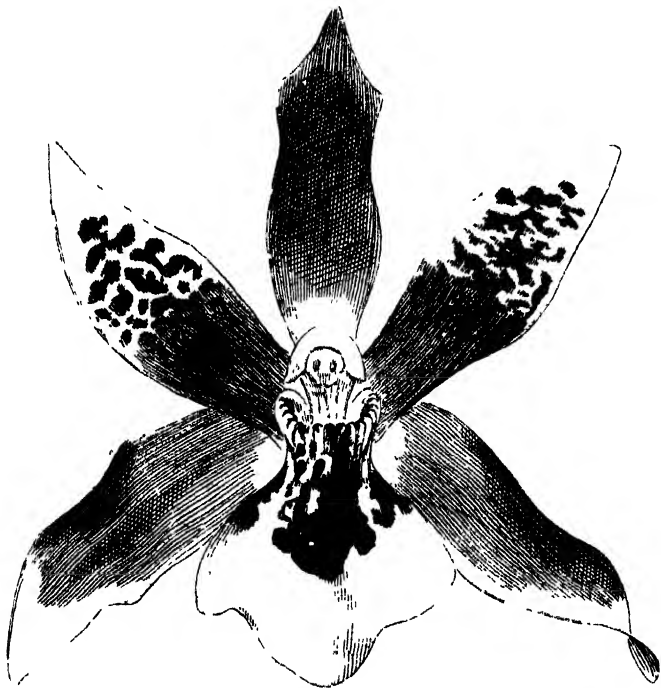


FIG. 79.—*ZYGOPETALUM BALLI*. (*Journal of Horticulture*.)

for a grand specimen of *Dendrobium* × *splendidiissimum grandiflorum*, with seven flowering pseudo-bulbs.

**Other Exhibits.**

Messrs. Hugh Low showed *Cattleya Trianaei* alba with thirty flowers, and other Orchids.

Messrs. Charlesworth showed *Epi-Lælia* × *heatonense* (L. *cinnabarina* × E. *Wallishii*).

A. H. Smee, Esq. (gr. Mr. Humphreys), sent varieties of *Cattleya Trianaei*.

J. S. Moss, Esq., sent *Cœlogyne Mossiæ* and *Cattleya Trianaei*.

Lieut.-Col. Shipway, (Grove House, Chiswick (gr. Mr. Walters), showed *Cattleya Trianaei* albens and *Cymbidium Tracyanum*.

De B. Crawshay, Esq., showed *Lælia Jongheana* and a form of *L. anceps*.

Messrs. B. S. Williams staged a collection of *Cypripediums* &c.

S. G. Lutwyche, Esq., Beckenham, showed *Cypripedium* × *beechense*.

The Right Hon. Lord Rothschild (gr. Mr. E. Hill) showed a variety of *Schomburgkia undulata* with red-brown flowers.

Baron Sir H. Schroder sent *Lælia Jongheana*.

Messrs. F. Sander, St. Albans, showed hybrid *Epidendrums*, *Phaius*, &c.

#### ORCHID COMMITTEE, MARCH 13, 1900.

J. GURNEY FOWLER, Esq., in the Chair, and fifteen members present.

#### Awards Recommended :—

##### *Silver Flora Medal.*

To T. B. Haywood, Esq., Woodhatch Lodge, Reigate (gr. Mr. C. J. Salter), for a fine group of hybrid *Dendrobiums* &c.

##### *Silver Banksian Medal.*

To J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whiffen), for a group of *Cattleya Trianaei*, and other Orchids.

##### *First-class Certificate.*

To *Odontoglossum* × *elegans*, 'Eastwood Park variety' (votes, unanimous), from Baron Sir H. Schroder, The Dell, Staines (gr. Mr. H. Ballantine). Flowers greenish yellow with brown blotches, larger than the ordinary form, which was also shown. (Fig. 80.)

##### *Award of Merit.*

To *Dendrobium* × *Burberryanum* (*Findlayanum* × *Dominianum*) (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White). Originally raised in the Right Hon. Joseph Chamberlain's gardens. Flowers of a bright rosy-crimson with white bases to the segments. Lip with dark purple centre, primrose disc and dark rose apex.

To *Odontoglossum crispum* 'Oakfield Sunrise' (votes, unanimous), from Thomas Baxter, Esq., Oakfield, Morcambe (gr. Mr. R. Roberts). A very extraordinary variety with white sepals, slightly tinged with pale yellow; petals narrower and rolled back at the edges and tips, white with the middle portions of each coloured red brown, a few reddish spots being also at the tips; lip narrow and turned back at the edges, white, with red lines at the base; crest yellow. (Fig. 81.)

To *Lælia Jongheana* (votes, unanimous), from H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood). A good typical form was shown.

To *Lælia Jongheana*, var. *Templeæ* (votes, unanimous), from Mrs. Temple, Leyswood, Groombridge (gr. Mr. E. Bristow). Flowers larger

than the type, of a bright rose colour, the lip bearing raised orange-coloured keels.

*Cultural Commendation.*

To Mr. F. J. Thorne (gr. to Major Joicey), Sunningdale Park, for a fine specimen of *Dendrobium atro-violaceum* with fifteen spikes of flowers.

**Other Exhibits.**

Sir Trevor Lawrence, Bart., showed *Dendrobium nobile virginale* and *D. n. Cooksonii*, 'Burford variety.'

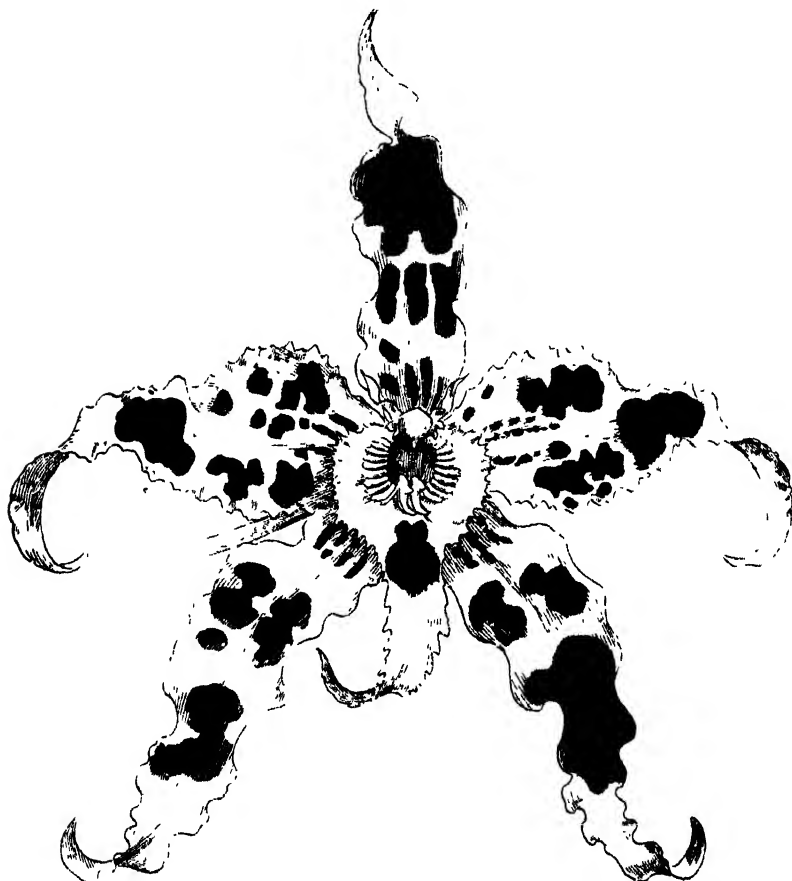


FIG. 80.—*ODONTOGLOSSUM ELEGANS*, 'EASTWOOD PARK VARIETY.'  
(*Journal of Horticulture*.)

Messrs. Jas. Veitch, Chelsea, showed hybrid *Lælio-Cattleyas* &c.

Norman C. Cookson, Esq. (gr. Mr. Wm. Murray), showed three fine varieties of *Phaius* × 'Norman' (*Sanderianus* × *tuberculosis*).

Messrs. Hugh Low staged a good group of Orchids.

His Grace the Duke of Richmond and Gordon (gr. Mr. Parker) sent *Dendrobium nobile* 'Lady Caroline Gordon-Lennox,' a very handsome form.

Mr. Jas. Cypher, Cheltenham, staged a group of *Dendrobiums* &c.

R. G. Thwaites, Esq., Streatham (gr. Mr. Black), showed various *Dendrobiums* &c.

R. I. Measures, Esq., Camberwell (gr. Mr. H. J. Chapman), showed *Cypripedium*  $\times$  *Boxallo-Rothschildianum*.

Walter Cobb, Esq., Tunbridge Wells (gr. Mr. J. Howes), showed *Odontoglossum*  $\times$  *elegantius*.

R. G. Fletcher, Esq., Brighton (gr. Mr. Garnett), showed *Odontoglossum crispum* 'Fay Fletcher.'



FIG. 81.—*ODONTOGLOSSUM CRISPUM* 'OAKFIELD SUNRISE.' (*Gardeners' Chronicle*.)

A. H. Wingfield, Esq., Ampthill (gr. Mr. Simpson), sent seedling *Cypripediums*.

Mr. H. A. Tracy, Twickenham, showed *Cattleya Trianaei* Furzeana.

Captain Holford, Westonbirt (gr. Mr. A. Chapman), sent a fine hybrid *Cypripedium* near to *C.*  $\times$  'Calypso,' named *C.*  $\times$  *Thompsoni inversum*, and a light-coloured *Cattleya Trianaei*.

Arthur Hay, Esq., Oakley Park, Eye, sent spikes of *Laelio-Cattleya*  $\times$  *albanensis*, *Dendrobium atro-violaceum* and *D. Johannis*.

ORCHID COMMITTEE, MARCH 27, 1900.

J. GURNEY FOWLER, Esq., in the Chair, and thirteen members present.

**Awards Recommended :—**

*Silver Flora Medal.*

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a good group of Orchids.

*Silver Banksian Medal.*

To Messrs. F. Sander, St. Albans, for a group of *Odontoglossums*, *Cypripediums*, &c.

To Messrs. Hugh Low, Bush Hill Park, for a group of Orchids.

*First-class Certificate.*

To *Dendrobium nobile album* (votes, unanimous) from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis), a pure-white

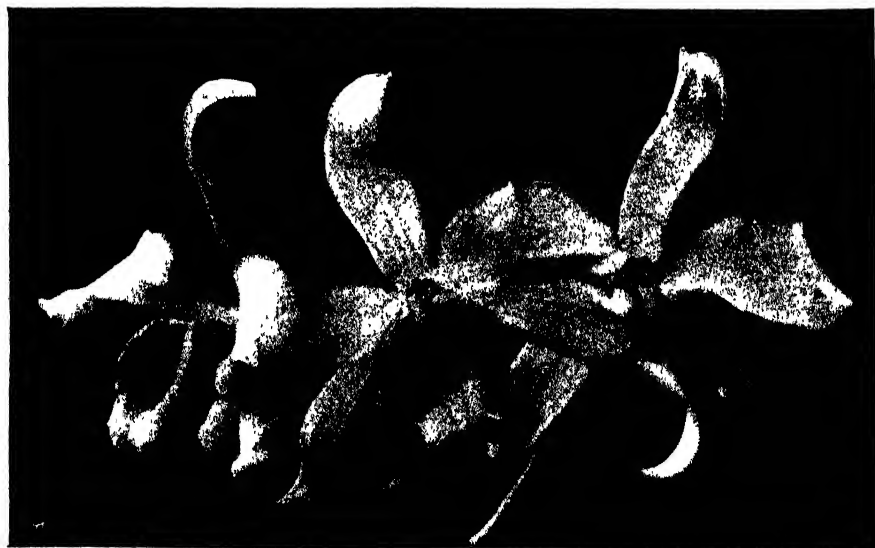


FIG. 82. --*DENDROBIUM NOBILE ALBUM*. (*The Garden*.)

form with a slight sulphur-yellow tinge on the lip. Syn. *D. nobile virginalae*. (Fig. 82.)

To *Dendrobium* × *Melpomene* (*signatum* × *splendidissimum grandiflorum*) (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White). Flowers three inches across, lemon-yellow, with a maroon disc on the labellum. (Fig. 83.)

*Award of Merit.*

To *Dendrobium* × *'Olio'* *superbum* (*splendidissimum grandiflorum* × *Wardianum*) (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers larger than the ordinary form ; sepals and

petals white, tipped with rose-purple; lip white, with a yellow and chocolate-coloured disc and rose-coloured apex. (Fig. 84.)

To *Cattleya Trianaei* 'Katie Wigan' (votes, unanimous), from Sir F. Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young). Flowers

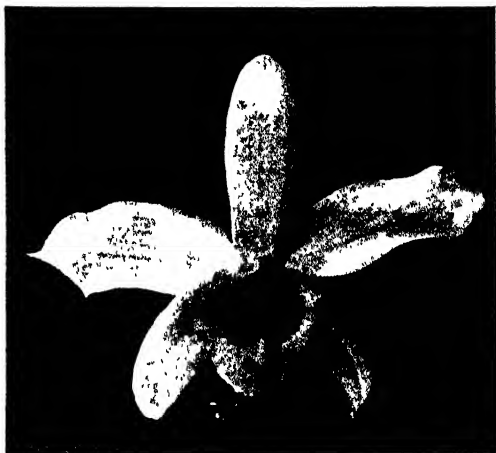


FIG. 83. — *DENDROBIUM MELPOMENE*. (*The Garden*.)

large, white suffused with rose; lip light rose with orange blotch in the centre and dark orange basal lines.

To *Odontoglossum triumphans* 'Raymond Crawshay' (votes, unanim-

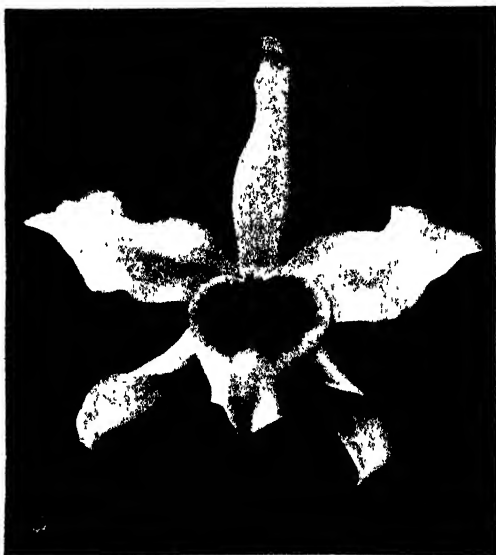


FIG. 84. — *DENDROBIUM CLIO SUPERBUM*. (*The Garden*.)

ous), from De B. Crawshay, Esq., Rosefield, Sevenoaks. A nobile form, of the typical species, but much larger and of a deeper yellow blotched with purplish brown. (Fig. 85.)

To *Ada aurantiaca* (votes, unanimous), from J. T. Bennett-Poë, Esq., Holmwood, Cheshunt (gr. Mr. Downes). A good example of the fine old orange-coloured species was shown.

To *Dendrobium aggregatum* (votes, unanimous), from H. T. Pitt, Esq. (gr. Mr. Thurgood). The major form, with fine orange-coloured flowers, was shown.

### Other Exhibits.

Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), showed *Masdevallia* × *Pourbaixii* and other *Masdevallias*.



FIG. 85. — *ODONTOGLOSSUM TRIUMPHANS* 'RAYMOND CRAWSHAW.'  
(*Journal of Horticulture*.)

R. G. Thwaites, Esq., Streatham, showed *Dendrobiums* and *Odontoglossums*.

G. W. Law-Schofield, Esq. (gr. Mr. Shill), showed *Cypripedium* × *Shillianum*.

Messrs. Jas. Veitch sent *Cypripedium* × 'Miss Rehder' (*hirsutissimum* × *Argus*).

Mr. A. J. Keeling, Bingley, showed *Lælia Jongheana*.

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## ORCHID COMMITTEE, APRIL 10, 1900.

J. GURNEY FOWLER, Esq., in the Chair, and seventeen members present.

**Awards Recommended:—**

*Silver Flora Medal.*

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.



FIG. 86. *CATTELYA INTERMEDIA*, 'FOWLER'S VARIETY.' (*Journal of Horticulture*.)

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a group of Orchids.

*First-class Certificate.*

To *Cattleya intermedia*, 'Fowler's variety' (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford. Flowers large; sepals and petals bluish-white; lip rich purple. Flower resembling

*Lælio-Cattleya* × *Schilleriana*, but the botanical features are true *Cattleya*. (Fig. 86.)

To *Zygopetalum Burtii*, 'Pitt's variety' (votes, unanimous), from H. T. Pitt, Esq. (gr. Mr. Thurgood). Segments white on the basal halves, yellow marked with brown on the outer portions; petals marked with two or three purple lines next the column. (Fig. 87.)

To *Cattleya Schröderæ* 'Pitt's variety' (votes, unanimous), from H. T. Pitt, Esq. (gr. Mr. Thurgood). An extraordinary colour variation,



FIG. 87.—*ZYGOPETALUM (BAFFMANNIA) BURTII*. (*The Garden*.)

the flowers being rosy-lilac with dark purple labellum having a lilac margin.

*Award of Merit.*

To *Phalænopsis* × 'Lady Rothschild' (intermedia *Brymeriana* × *Sanderiana*) (votes, unanimous), from Messrs. Hugh Low, Bush Hill Park; in form and colour resembling *P. × intermedia Brymeriana*, but with much larger flowers; sepals and petals white, with the middle area of each marked with purple; front lobe of the lip dark reddish rose.

To *Odontoglossum luteo-purpureum* Mossii (votes, unanimous), from De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. S. Cooke). Sepals and petals yellow, heavily blotched with chocolate colour; lip white, with the usual yellow crest and a large brown blotch in the centre.

To *Cypripedium* × 'J. Gurney Fowler' (*barbatum* Crossii ♀ *Godefroyæ* ♂) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. Flowers white, delicately tinged with purple.

To *Larlio-Cattleya* × 'Rosalind' *superba* (L.-C. *Dominiana* ♂ *Trianaei* ♀) (votes, 7 for, 1 against), from Messrs. Jas. Veitch. Flowers pale lilac; front of the lip ruby red.

To *Epidendrum* × *Clarissa* (*elegantulum* ♂ *Wallisii* ♀) (votes



FIG. 88.—*ODONTOGLOSSUM TRIUMPHANS* 'LIONEL CRAWSHAY.' (*Journal of Horticulture*.)

unanimous), from Messrs. Jas. Veitch. Resembling *E. × Endresio-Wallisii*, but larger; sepals and petals white, tinged with red in the centre; lip violet, with white base and margin.

#### *Botanical Certificate.*

To *Polystachya laxiflora*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Habit of plant compact; flowers white and rather large for the genus.

To *Eulophia tristis*, from A. H. Smee, Esq. (gr. Mr. Humphreys). A singular West African species of small size; pseudo-bulbs like those of some *Cymbidiums*; inflorescence branched; flowers greenish with purple labellum.

*Cultural Commendation.*

To Mr. Downes, gr. to J. T. Bennett-Poë, Esq., Holmewood, Cheshunt, for a basket of well-bloomed plants of *Lælia harpophylla* grown in a cold house.

**Other Exhibits.**

Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), showed some fine hybrid *Dendrobiums* &c.

Messrs. F. Sander, St. Albans, showed a small group of Orchids.

De B. Crawshay, Esq., Sevenoaks (gr. Mr. S. Cooke), showed *Odontoglossum triumphans* 'Rex' and other good *Odontoglossums*. (Fig. 88.)

Mr. H. A. Tracy, Twickenham, showed *Miltonia Roezlii splendens* and a fine form of *Dendrobium atrovioleaceum*.

Mr. A. Fisher, Farningham Road, Tottenham, showed *Cypripedium* × (*insigne albo-marginatum* × *concolor*).

ORCHID COMMITTEE, APRIL 24, 1900.

HENRY LITTLE, Esq., in the Chair, and sixteen members present.

**Awards Recommended :—**

*Silver Flora Medal.*

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a good group of Orchids.

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a good group of Orchids.

To W. A. Bilney, Esq., Fir Grange, Weybridge (gr. Mr. Whitlock), for a group of fine *Dendrobiums*.

*Silver Banksian Medal.*

To Messrs. Hugh Low, Bush Hill Park, for a group of Orchids.

*First-class Certificate.*

To *Odontoglossum* × *Andersonianum* *Cooksonii* (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Wm. Murray). A very large flower, pale yellow, spotted with brown.

To *Odontoglossum crispum* 'The Earl' (votes, unanimous), from W. Thompson, Esq., Walton Grange, Stone, Stafford (gr. Mr. Stevens). Sepals white at base and apex, the central two-thirds brown; petals white, with a cluster of brown blotches; disc of lip yellow, with a brown blotch in front. (Fig. 89.)

To *Odontoglossum crispum* 'Victoria Regina' (votes, unanimous), from W. Thompson, Esq. (gr. Mr. Stevens). Flowers tinted with rose purple and spotted with reddish purple.

To *Cattleya Schilleriana*, 'Pitt's variety' (votes, unanimous), from H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood). A very dark and finely coloured form, the labellum being almost wholly of a crimson-purple colour.

*Award of Merit.*

To *Odontoglossum* × *Wendlandianum* *Crawshayanum* (votes, unanimous), from De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. S. Cooke). A singular hybrid presumably between *O. crinitum* and *O. crispum Lehmannii*. Flowers heavily tinged with claret colour and blotched with chocolate-purple; lip white, with a spiny crest and some purplish spots. (Fig. 90.)

To *Dendrobium* *Wardianum*, 'Fir Grange variety' (votes, unanimous), from W. A. Bilney, Esq., Fir Grange, Weybridge (gr. Mr. Whitlock).



FIG. 89. - *ODONTOGLOSSUM CRISPUM* 'THE EARL.' (*Journal of Horticulture*.)

Flowers large, tipped with carmine pink, instead of the rose-purple colour of the type.

*Botanical Certificate.*

To *Cirrhopetalum fimbriatum*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Imported from Koorg, India. The plant bore twelve umbels of flowers, varying in colour from green to purple.

To *Dendrobium macrostachyum*, from Sir Trevor Lawrence, Bart. Growth and form of flower similar to *D. Pierardii*, but flowers much smaller.

**Other Exhibits.**

Sir James Miller, Bart. (gr. Mr. Hamilton), showed *Lælia-Cattleya* 'Lady Miller' (*C. g. Schofieldiana* × *L. cinnabarina*), which the Committee desired to see again when mature.

Sir Trevor Lawrence, Bart., showed *Cattleya Schröderæ* alba with nine flowers, and *Dendrobium teretifolium* with sixteen spikes.

Walter Cobb, Esq. (gr. Mr. J. Howes), showed fine forms of *Odontoglossum triumphans* &c.

Jeremiah Colman, Esq. (gr. Mr. W. P. Bound), sent *Odontoglossum* × *Andersonianum*, 'Gatton Park variety.'

Mr. H. A. Tracy, Twickenham, showed *Cattleya Schröderæ* regalis.



FIG. 90.—*ODONTOGLOSSUM* × *WENDLANDIANUM* CRAWSHAYANUM. (*Gardeners' Chronicle*.)

Henry Little, Esq., Twickenham, showed the white *Lælia purpurata* Tracyana.

Messrs. Jas. Veitch sent hybrid Orchids.

W. Vanner, Esq., sent *Cypripedium* × *Leysenianum*.

R. Brooman-White, Esq., showed forms of *Cattleya Schröderæ*.

M. Florent Claes, Brussels, sent *Physurus* (*Anæctochilus*) *Ortgiesi*.

De B. Crawshay, Esq., showed a collection of good forms of *Odontoglossum crispum*.

## ORCHID COMMITTEE, MAY 8, 1900.

NORMAN C. COOKSON, Esq., in the Chair, and sixteen members present.

**Awards Recommended :—***Gold Medal.*

To Leopold de Rothschild, Esq., Gunnersbury Park (gr. Mr. Reynolds), for a fine and artistically arranged group of *Vanda teres*, the plants bearing over two hundred spikes of fine rose-coloured flowers.

To Messrs. Jas. Veitch, Chelsea, for a very fine group of hybrid and other Orchids.

*Silver Flora Medal.*

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a group of fine *Odontoglossums* &c.

To Messrs. Linden, l'Horticole Coloniale, Brussels, for an interesting group of *Odontoglossums*.

*Silver Banksian Medal.*

To Lieut.-Colonel Shipway, Chiswick (gr. Mr. Walters), for a group of *Cattleya Mendelii* &c.

*First-class Certificate.*

To *Odontoglossum crispum aureum rosefieldiense* (votes, unanimous), from De B. Crawshay, Esq., Sevenoaks (gr. Mr. S. Cook). Flower of fine form, canary-yellow in colour.

To *Odontoglossum crispum Pittianum* (votes, unanimous), from H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood). Flower large, heavily blotched with purple brown. Of the *O. c. apiatum* section. (Fig. 91.)

*Award of Merit.*

To *Lælio-Cattleya* × *Hyeana* (*L. purpurata* × *C. Lawrenceana* ♂) (votes, 8 for, 3 against), from Messrs. Jas. Veitch, Chelsea. Flowers rosy-lilac, with purplish crimson front to the lip.

To *Lælia purpurata* 'Ethel Grey' (votes, unanimous), from Sir F. Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young). Flowers white with rose front to the lip, in which there was also some purplish veinings.

To *Cypripedium* × 'Phæbe' (*philippinense* × *bellatulum*) (votes, unanimous), from W. M. Appleton, Esq., Tyn-y-Coed, Weston-super-Mare. A distinct hybrid with whitish flowers, the petals and dorsal sepal bearing purple lines and small spots.

To *Odontoglossum crispum tessellatum* (votes, 9 for, 2 against), from Messrs. Linden. Flowers white, tinged at the backs with purple, and on the face spotted with purple.

*Botanical Certificate.*

To *Masdevallia O'Brieniana*, from R. I. Measures, Esq., Camberwell (gr. Mr. H. J. Chapman). A pretty dwarf tufted species with numerous purple and yellow flowers borne on very short stalks.

To *Epidendrum vesicatum*, Lindl., from A. H. Smee, Esq. (gr. Mr. Humphreys). Growths compressed, leaves fleshy, glaucous. Flowers in round terminal heads, greenish.

**Other Exhibits.**

Jeremiah Colman, Esq., Gatton Park (gr. Mr. W. P. Bound), showed



FIG. 91.—*ODONTOGLOSSUM CRISPUM PITTIANUM*. (*The Garden.*)

two ornamental stands effectively decorated with fine spikes of *Odontoglossums* and other Orchids.

R. Brooman-White, Esq., Arddarroch (gr. Mr. Cole), showed spikes of *Odontoglossums* and *Cattleya Schröderæ*.

Fred Hardy, Esq., Tyntesfield, Ashton-on-Mersey (gr. Mr. T. Stafford), showed *Dendrobium* × (*nobile* × *Farmeri*). Flowers in colour and size like *D. nobile*, but the labellum more flat, and the inflorescence displaying a tendency to be racemose.

G. F. Moore, Esq., Chardwar, Bourton-on-the-Water (gr. Mr. Morris), sent two very fine spikes of *Cattleya Lawrenceana*.

Messrs. F. Sander, St. Albans, showed *Lælio-Cattleya* × Harold Morris (*C. Regnelli* × *L.-C.* × *Schilleriana*).

Messrs. Jas. Veitch showed *Lælio-Cattleya* × 'G. S. Ball' (*L. cinnabarina* ♂ *C. Schröderæ* ♀).

## TEMPLE SHOW, MAY 23, 1900.

### ORCHID COMMITTEE.

HARRY J. VEITCH, Esq., in the Chair, and twenty-two members present.

### Awards Recommended:—

The list of Cups and Medals awarded by the Council will be found on page xvi.

#### *First-class Certificate.*

To *Lælio-Cattleya* × *callistoglossa*, var. *excelsa* (*C. Warscewiczii* *Sanderiana* × *L. purpurata*) (votes, unanimous), from Messrs. F. Sander, St. Albans. Flowers large; sepals and petals bright rose; front of lip ruby-purple, disc yellow.

To *Lælia purpurata* *Littleiana* (votes, unanimous), from Henry Little, Esq., Baronshalt, Twickenham. Sepals and petals pure white; lip with rose-purple markings on each side and fine purple lines on yellow ground at the base. (Fig. 92.)

To *Odontoglossum* × *Adrianæ* 'Ernest Ashworth' (votes, unanimous), from Elijah Ashworth, Esq., Harefield Hall, Wilmslow (gr. Mr. Holbrook). Flowers of fine form, white, with one large and several smaller red-brown blotches on each segment.

To *Odontoglossum* × *Adrianæ* 'Arthur Ashworth' (votes, unanimous), from Elijah Ashworth, Esq. (gr. Mr. Holbrook). Flowers similar to the variety named 'Ernest Ashworth,' but with a pale yellow-ground colour. (Fig. 93.)

To *Odontoglossum* × 'Souvenir de Victor Hye de Crom' (*Harryanum* × *luteo-purpureum*) (votes, unanimous), from M. Jules Hye-Leyzen, Ghent (gr. Mr. Coen). Flowers somewhat resembling a large *O. Harryanum*. Sepals and petals whitish, heavily barred with purple; lip white, with violet markings at the base. (Fig. 94.)

To *Odontoglossum* × *Rolfæ optimum* (*Harryanum* × *Pescatorei*) (votes, unanimous), from M. Chas. Vuylsteke, Loochristy, Ghent. In form the flowers distinctly showed the influence of *O. Pescatorei*. Sepals and petals French-white blotched with purple; lip broad, white, with purple markings around the crest. (Fig. 95.)

#### *Award of Merit.*

To *Cattleya Mossiæ Rouseliana* (votes, unanimous), from the Marquis de Waveren, Somerghem, Belgium. A very fine variety, with flowers of a bright amethyst-rose colour, the front of the lip being of a rich purplish crimson, with lighter margin.

To *Odontoglossum crispum* 'Confetti' (votes, unanimous), from l'Horticole Coloniale, Brussels. Flowers white, with purple blotches.

To *Odontoglossum crispum radiosum* (votes, unanimous), from l'Horticole Coloniale. Flowers white tinged with lilac; the segments bearing an irregular large blotch of purple colour and some smaller blotches.



FIG. 92.—*CATLEYA PURPURATA LITTLEIANA*. (*Journal of Horticulture*.)

To *Odontoglossum*  $\times$  *Rolfei* *ardentissimum* (*Harryanum*  $\times$  *Pescatorei*) (votes, unanimous), from M. Chas. Vuylsteke, Ghent. Flowers whitish, with purple markings.

To *Cattleya Mossiae* 'Our Queen' (votes, unanimous), from Messrs. F. Sander, St. Albans. A very handsome form, with white flowers, the front area of the lip inside the margin being of a bright crimson; the disc yellow.

To *Cypripedium*  $\times$  'Mary Beatrice' (*Gowerianum magnificum*  $\times$  *bella-*



FIG. 93. -- *OENOGLOSSUM* ADRIANE 'ARTHUR ASHWORTH.' (*Gardeners' Magazine*.)

tulum) (votes, unanimous), from G. W. Law-Schofield, Esq., Rawten-stall (gr. Mr. Shill); and Messrs. Charlesworth, Bradford. Fine in form and substance. Flowers of a reddish-rose colour, the darker feathering in the dorsal sepal changing to rose towards the margin, petals bearing chocolate-coloured spots.

To *Lycaste* × 'G. S. Ball' (*plana* Measuresiana × *Skinneri*) (votes, unanimous), from Messrs. Charlesworth, Heaton, Bradford. Flower in



FIG. 94. ODONTOGLOSSUM 'SOUVENIR DE VICTOR HIE DE CROM.'  
(*Journal of Horticulture.*)

form nearest to *L. Skinneri*; reddish-rose colour, with crimson markings on the lip. (Fig. 97.)

To *Cymbidium* × *P. Ansoni* (votes, 9 for, 5 against), from Messrs. Hugh Low, Bush Hill Park. A supposed natural hybrid with some resemblance to *C. × eburneo-Lowianum*. (Fig. 96.)

To *Cattleya Mossiae* Wageri, 'Hassel's variety' (votes, unanimous), from Messrs. S. Mobbs & Ashton, Southgate. Flowers large, pure white, with chrome-yellow markings on the lip.

To *Lælio-Cattleya* × *Massangeana* (*L. tenebrosa* × *C. Schilleriana*) (votes, unanimous), M. A. A. Peeters, St. Gilles, Ghent. Sepals and petals bronzy red; lip rich crimson. In form nearest to *C. Schilleriana*.

To *Lælio-Cattleya* × 'Herode' (*C. O'Brieniana* × *L.-C. × elegans*) (votes, unanimous), from M. A. A. Peeters. A fine hybrid, with sepals and petals of a light rose colour; lip openly displayed, ruby red in front, with yellow and white disc.

To *Odontoglossum crispum* 'Mrs. F. Peeters' (votes, unanimous), from M. A. A. Peeters. A fine blush-white flower, blotched with purple and shaded with rose.

To *Odontoglossum crispum* 'Victoria Regina' (votes, unanimous), from M. A. A. Peeters. Flowers of fine form, white tinged with rose and blotched with reddish purple; petals fringed.



FIG. 95.- *ODONTOGLOSSUM ROLFEI* OPTIMUM (*Journal of Horticulture*.)

#### *Botanical Certificate.*

To *Calanthe veratrifolia*, from Sir Trevor Lawrence, Bart. The typical species was shown in a fine specimen.

To *Dendrobium hercoglossum*, from Sir Trevor Lawrence, Bart. Flowers white tinged with rose.

To *Dendrobium candidum*, from Sir Trevor Lawrence, Bart. Flowers white. A highland Indian species, in habit like the Japanese *D. moniliforme*.

#### *Cultural Commendation.*

To Mr. W. H. White, gr. to Sir Trevor Lawrence, Bart., for a fine *Miltonia* × *Bleuana nobilior*, with fifteen flowers.

To M. A. A. Peeters, Brussels, for *Eulophiella Peetersiana*.

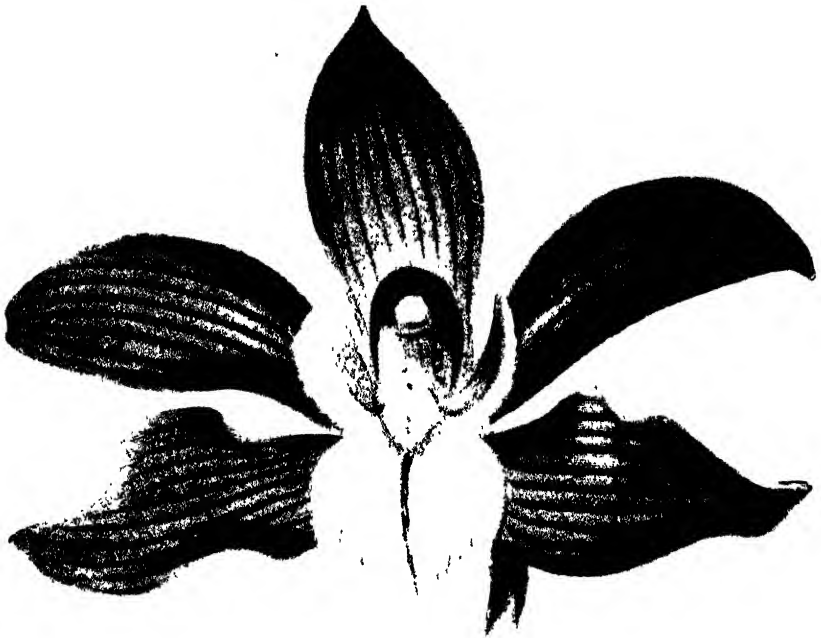


FIG. 96.—*CYMBIDIUM l'ANSONI.* (*Journal of Horticulture.*)

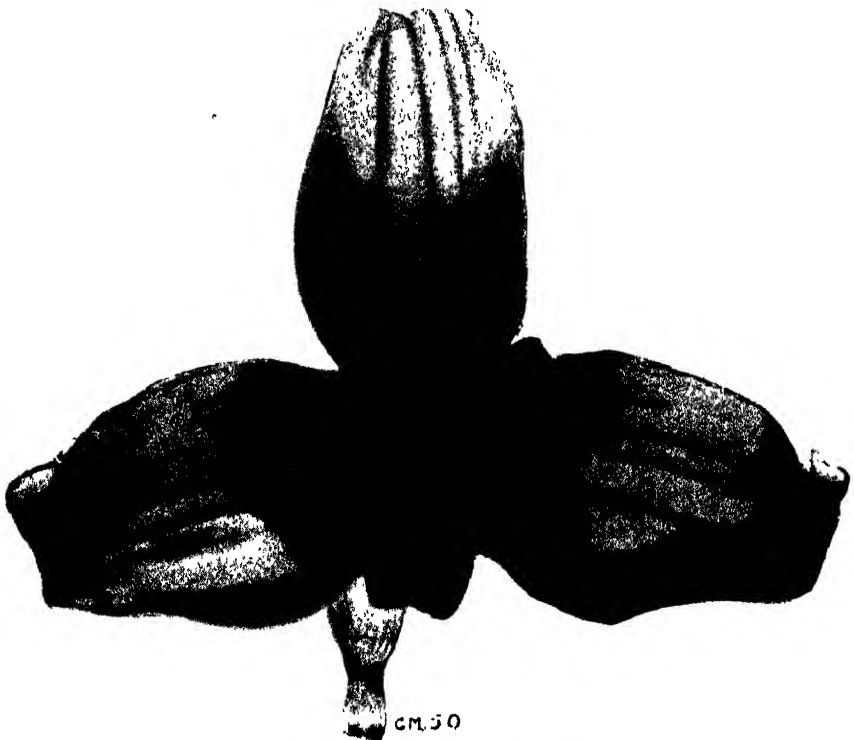


FIG. 97.—*LYCASTE 'G. S. BALL.'* (*Gardeners' Magazine.*)

### Other Exhibits.

Sir Trevor Lawrence, Bart., showed a number of rare Orchids of botanical interest.

Sir Frederick Wigan, Bart., showed a fine plant of a rare *Miltonia vexillaria* and other choice varieties.

Messrs. Linden, Brussels, staged a fine group of *Odontoglossums*.

Messrs. F. Sander showed new hybrids &c.

Messrs. Charlesworth showed hybrid and other Orchids.

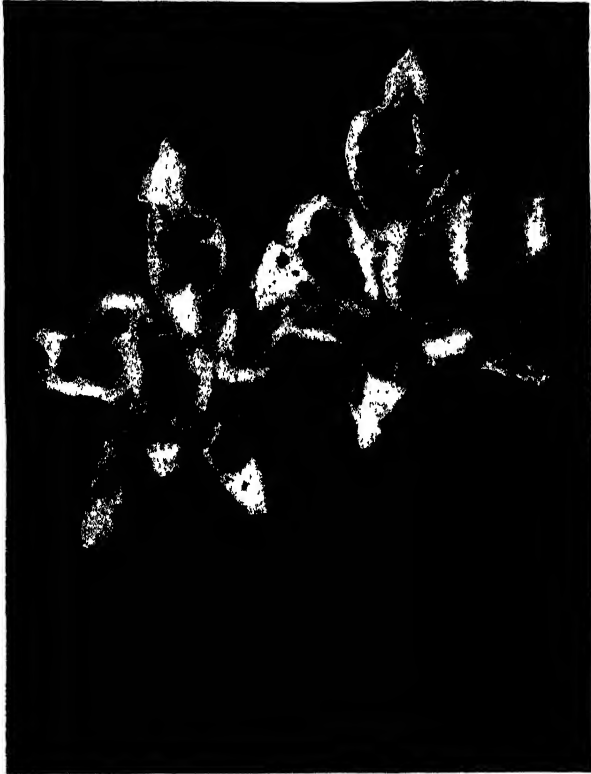


FIG. 98.—*ODONTOGLOSSUM CRISPUM BRITANNIA*. (*The Garden*.)

M. Jules Hye-Leysen, Ghent, showed *Laelio-Cattleya* × 'General Baden-Powell' (*L. tenebrosa* × *C. Lawrenceana*) and *Odontoglossum* × *Adrianæ* 'Mascotte.'

Mr. James Cypher, Cheltenham, staged a fine group of Orchids.

Messrs. Stanley Mobbs & Ashton, Southgate, staged an extensive group of Orchids.

Messrs. Hugh Low showed *Odontoglossum crispum* 'Britannia' (fig. 98) and other new varieties.

ORCHID COMMITTEE, JUNE 5, 1900.

HARRY J. VEITCH, Esq., in the Chair, and fourteen members present.

**Awards Recommended:—**

*Silver Flora Medal.*

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a fine group of Orchids.

*Silver Banksian Medal.*

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a group of Cattleyas, Odontoglossums, &c.

*Award of Merit.*

To *Dendrobium* × *Dalhousie-nobile* (*Dalhousieanum* × *nobile*) (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White). A very handsome hybrid originally raised by R. Brooman-White, Esq. Flowers larger than *D. nobile*, the leaves of the sepals and petals white, the remainder veined and tinged with rose-purple; lip flat in front, slightly concave at base; disc claret colour, the remainder white with rose apex. (Fig. 99.)

To *Cypripedium* × *Godefroya* 'Wigan's variety' (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). Flowers pure white with a marbling of purple at the back of the dorsal sepal, and some small purple spots on the petals.

*Botanical Certificate.*

To *Dendrobium stuposum*, from Sir F. Wigan, Bart. (gr. Mr. W. H. Young). A slender species with small white flowers.

To *Phalænopsis fuscata*, from Sir F. Wigan, Bart. Flowers small, brown, the front of the lip circular and with whitish margin.

To *Phalænopsis Manni*, from Sir Frederick Wigan, Bart. Flowers small, yellow and brown.

To *Brassia maculata*, from Sir F. Wigan, Bart. Flowers whitish with brown markings.

To *Oncidium nanum*, from Mr. Ed. Kromer, Bandon Hill, Croydon. A dwarf species, with fleshy leaves and descending inflorescence of brown flowers, the segments being edged with yellow; front of lip yellow; habit of growth like *O. pumilum*.

**Other Exhibits.**

R. I. Measures, Esq. (gr. Mr. H. J. Chapman), showed *Miltonia vexillaria*, 'Cambridge Lodge' variety, and *Saccolabium ampullaceum moulmeinense* with six spikes.

Sir J. Miller, Bart. (gr. Mr. J. Hamilton), showed *Laelio-Cattleya* × *Lady Miller*, L.-C. × *Martineti*, and another hybrid.

De B. Crawshaw, Esq. (gr. Mr. S. Cooke), showed *Odontoglossum crispum* 'Cecile de Rochfort' and others.

Mr. Jas. Douglas, V.M.H., showed *Cattleya Warnerii* and *C. Mendelii* albens.

Mr. H. A. Tracy sent *Cattleya Mossiæ*.



FIG. 99. — *DENDROBIUM DACTYLOSIE-NOBILE*. (*Gardener's Magazine*.)

W. A. Gillett, Esq. (gr. Mr. Carr), showed a fine *Odontoglossum crispum*.

ORCHID COMMITTEE, JUNE 19, 1900.

HARRY J. VEITCH, Esq., in the Chair, and nineteen members present.

**Awards Recommended:—**

*Silver Flora Medal.*

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White), for a group of Orchids excellently well grown.

To Baron Sir H. Schröder, The Dell, Staines (gr. Mr. H. Ballantine), for a collection of fine *Odontoglossums* and *Lælio-Cattleyas*.

To H. F. Simonds, Esq., Beckenham (gr. Mr. Geo. Day), for a group of Orchids.

To J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis), for a good group of Orchids.

To F. A. Bevan, Esq., Trent Park, New Barnet (gr. Mr. A. Ward), for *Cœlogyne Dayana* with fifty long racemes of flowers, which in the aggregate numbered two thousand.

*Silver Banksian Medal.*

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group of *Odontoglossums*, *Cattleyas*, &c.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. W. P. Bound), for a group of *Odontoglossums*, *Cattleya Mossiæ Reineckiana*, &c.

To M. Florent Claes, Brussels, for a collection of *Odontoglossums*.

To Messrs. Stanley, Mobbs & Ashton, Southgate, for a group of Orchids.

To Messrs. Hugh Low, for a group of Orchids.

*First-class Certificate.*

To *Odontoglossum* × *Rolfeæ*, 'Walton Grange variety' (*Pescatorei* × *Harryanum*) (votes, unanimous), from W. Thompson, Esq., Walton Grange, Stone (gr. Mr. Stevens). A larger flower, and with more purple colouring, than the two to which awards had previously been given. (Fig. 100.)

*Award of Merit.*

To *Sobralia* × *Veitchi aurea* (*macrantha* × *xantholeuca*) (votes, 8 for, 1 against), from Sir F. Wigan, Clare Lawn, East Sheen (gr. Mr. W. H. Young). Flowers wholly bright yellow. A singular case of seedling variation towards *S. xantholeuca*, none of the rose colour of *S. macrantha* appearing, as it does in other forms.

*Botanical Certificate.*

To *Eulophia gracilis*, from A. H. Smee, Esq., The Grange, Hackbridge (gr. Mr. Humphreys). A slender species with upright spikes of greenish flowers.

*Cultural Commendation.*

To Messrs. Stanley Mobbs & Ashton, for a fine specimen of *Cattleya Mossiæ* with upwards of forty flowers.

### Other Exhibits.

Messrs. Charlesworth, Heaton, showed a fine white *Dendrobium Phalaenopsis hololeucum* and *Cypripedium* × *Chapmanii heatonense*.

Messrs. B. S. Williams showed an interesting collection of *Vandas*, *Cypripediums*, &c.

Sir F. Wigan (gr. Mr. W. H. Young) showed two forms of *Phalaenopsis speciosa* and *P. amabilis*.

D. M. Grimsdale, Esq. (gr. Mr. J. A. Hooker), sent cut spikes of *Odontoglossums*.

R. W. Rickards, Esq., Usk, showed a yellow spotted *Odontoglossum crispum*.

Mr. Jas. Douglas, V.M.H., sent *Dendrobium tortile*.



FIG. 100.—*ODONTOGLOSSUM ROLFEAE*, 'WALTON GRANGE VARIETY.'  
(*Journal of Horticulture*.)

W. P. Burkinshaw, Esq., Hull, sent *Cattleya Mendelii* Maudia.

Sir Jas. Miller, Bart., Duns (gr. Mr. J. Hamilton), showed *Laelia* × *Eveline* (*tenebrosa* × *præstans*).

J. B. Joel, Esq., Northaw House (gr. Mr. May), sent *Cattleya Warscewiczii imperialis*.

Messrs. Heath & Son showed *Laelia Digbyana*.

J. S. Moss, Esq., sent a spike of *Odontoglossum* × *Wilckeanum* Mossie.

RICHMOND, JUNE 27, 1900.

ORCHID COMMITTEE.

HARRY J. VEITCH, Esq., in the Chair, and twelve members present.

**Awards Recommended :—**

*First-class Certificate.*

To *Odontoglossum crispum* 'Duchess of Connaught' (votes, unanimous), from Mrs. Briggs-Bury, Bank House, Accrington (gr. Mr. Wilkinson). A very distinct form with undulated slightly incurved segments, tinged heavily at the backs and lightly in front with rose-purple, and prettily spotted with red brown.

To *Cattleya Mendelii* *albens*, 'Princess of Wales' (votes, unanimous),

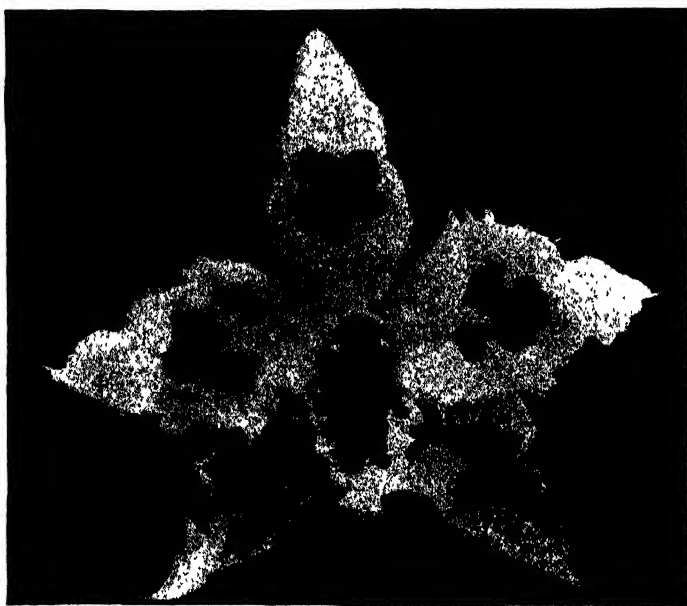


FIG. 101.—*ODONTOGLOSSUM CRISPUM* 'EMPRESS OF INDIA.' (*The Garden.*)

from Mr. H. A. Tracy, Amyand Park Road, Twickenham. Flowers of perfect form, white, with a delicate blush-pink tinge and yellow markings on the centre of the lip.

*Award of Merit.*

To *Odontoglossum crispum* 'Empress of India' (votes, unanimous), from Mrs. Briggs-Bury, Bank House, Accrington (gr. Mr. Wilkinson). A fine flower of the *O. c. apiatum* class. White tinged with rose, and bearing large chestnut-brown blotches on the sepals and petals. (Fig. 101.)

**Other Exhibits.**

Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), staged an extensive and select group of Orchids.

Henry Little, Esq., Baronshalt, Twickenham (gr. Mr. Howard), staged a fine group of Orchids.

Messrs. Hugh Low, Bush Hill Park, had a good group of Cattleyas and other Orchids.

Mr. H. A. Tracy, Twickenham, showed Cattleya Mendelii 'La Belle.'

#### ORCHID COMMITTEE, JULY 8, 1900.

HARRY J. VEITCH, Esq., in the Chair, and thirteen members present.

##### *Silver-gilt Flora Medal.*

To Messrs. Veitch, Chelsea, for a fine group of Orchids.

##### *First-class Certificate.*

To Lælio-Cattleya × Wiganiae (L.-C. × Gottoiana × C. Mossiæ) (votes, unanimous), from Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young). A fine hybrid, equal in size and form of flower to C. Mossiæ. Sepals and petals light yellowish-rose colour; lip rose purple, with dark claret-coloured lines and veining.

To Lælio-Cattleya × 'Henry Greenwood' superba (L.-C. × Schilleriana × C. × Hardyana) (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). A fine improvement on the original form. Sepals and petals pale rose; lip rich ruby purple in front, and chrome yellow in the centre. (Fig. 102.)

##### *Botanical Certificate.*

To Broughtonia sanguinea, from J. T. Bennett-Poe, Esq., Holmwood, Cheshunt (gr. Mr. Downes). The fine old species was well-flowered, its blooms being bright carmine crimson.

To Colax viridis, from Messrs. Jas. Veitch. Flowers emerald green, with violet markings on the lip.

#### Other Exhibits.

Jeremiah Colman, Esq., Gatton Park (gr. Mr. W. P. Bound), showed Odontoglossum crispum, 'Gatton Park variety.'

J. Wilson Potter, Esq., Park Hill Road, Croydon, showed Odontoglossum crispum 'Lady Jane,' in form resembling O. c. 'Oakfield Sunrise,' and with some brown markings on the petals. (Fig. 81.)

J. Garney Fowler, Esq., South Woodford (gr. Mr. Davis), sent Cypripedium × Curtiso-præstans.

Dr. F. P. Davis, Maidstone, showed Cattleya granulosa Buyssoniana.

Messrs. Hugh Low showed forms of Cattleya Mossiæ &c.

De B. Crawshay, Esq., Sevenoaks (gr. Mr. S. Cooke), showed Cattleya Mendelii rosefieldiensis and a large form of Lælia tenebrosa.

Mr. A. J. Keeling, Cottingley, Bingley, Yorks, sent Dendrobium moschatum.

Messrs. Paul & Son, Cheshunt, sent Orchis × folioso-maculata, and the two species from which it was derived.

c) PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Mr. T. R. Cuckney, Cobham Hall, showed a fine pan of *Ophrys apifera*.

A. H. Smee, Esq., Hackbridge (gr. Mr. Humphreys), sent *Eulophia euglossa*.



FIG. 102.—*LAELIO-CATTELEYA* 'HENRY GREENWOOD' SUPERBA.  
(*Journal of Horticulture*.)

A. J. Hollington, Esq., Forty Hill, Enfield (gr. Mr. Ayling), showed *Cypripedium* × 'General French.'

ORCHID COMMITTEE, JULY 17, 1900.

HARRY J. VEITCH, Esq., in the Chair, and twelve members present.

*Gold Medal.*

To Miss N. Roberts, 72 Loughborough Road, S.W., for the excellence of her Orchid paintings.

**Awards Recommended :—***Silver Flora Medal.*

To H. F. Simonds, Esq., Woodthorpe, Beckenham (gr. Mr. Geo. E. Day), for a group of Orchids, in which were two finely flowered plants of *Grammangis Ellisii*.

*Silver Banksian Medal.*

To Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), for a very interesting group of rare Orchids.

To W. E. Brymer, Esq., M.P., Dorchester (gr. Mr. Powell), for a



FIG. 103.—*PHAIUS*  $\times$  *OAKWOODIENSIS*. (*Gardeners' Chronicle*.)

magnificent specimen of *Cœlogyne Sanderiana* covered with large white flowers.

*First-class Certificate.*

To *Phaius*  $\times$  *oakwoodiensis* ( $\times$  *Cooksonii*  $\times$  *Humblotii*) (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Wm. Murray). A fine and distinct hybrid, of similar habit of growth and form of flower to *P. Humblotii*, but larger in all its parts. Sepals and petals white tinged with purplish rose; lip, including the large extended side lobes, crimson purple; callus yellow. (Fig. 103.)

To *Maxillaria scurrilis*, Lehm. (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A most remarkable species with strong growths resembling *M. grandiflora*, and strikingly handsome

flowers with long ribbon-like segments, the lateral sepals being arched and curved at the shoulders. Segments white, spotted with purple in the area around the column, the remainder yellow, with chocolate-purple spots. (Fig. 104.)

*Award of Merit.*

To *Angræcum filicornu* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A small species with fleshy, channelled leaves and narrow petalled pure-white flowers, having slender greenish spurs six inches in length. (Fig. 105.)

To *Cypripedium* × *Wiertzianum* 'Burford Var.' (votes, 5 for, 3 against), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Upper sepal

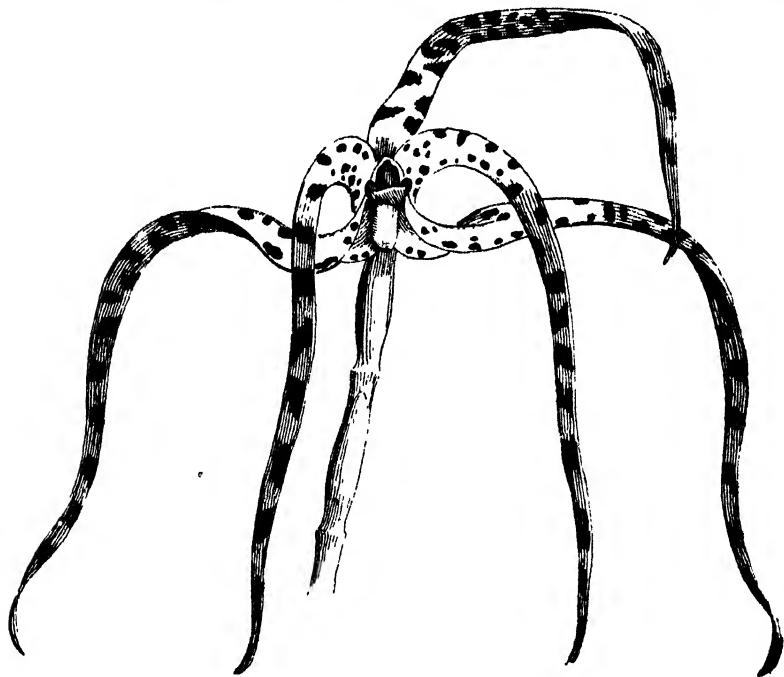


FIG. 104. -*MAXILLARIA SCURRIELIS*. (*Journal of Horticulture*.)

cream-white with purple lines; petals extended, cream-white, with dark purple spots; face of the labellum dull rose.

To *Masdevallia deorsa*, Lehm. (votes, unanimous), from F. W. Moore, Esq., V.M.H., Glasnevin, Dublin. A remarkable species, growing head downward, and bearing narrow pale green fleshy leaves a foot in length. Flowers pendulous, large, whitish or honey-yellow, tinged and spotted with purple on the outside, the colour showing through to the front; tails long and slender.

To *Odontoglossum coronarium*, 'Glasnevin variety' (votes, 6 for, 3 against), from F. W. Moore, Esq., V.M.H. Flowers all yellow, the brown markings of the type being nearly suppressed.

*Botanical Certificate.*

To *Tainia speciosa*, from Sir Trevor Lawrence, Bart. A Malayan

species with upright spikes of conspicuous whitish flowers with purple lines.

To *Sarcanthus peninsularis*, from Sir Trevor Lawrence, Bart. Allied to *S. pugioniformis*, but more slender in growth. The fine plant shown bore a dozen spikes.

To *Masdevallia maculata*, from Sir Trevor Lawrence, Bart. Flowers narrow, yellow tinged with purple.

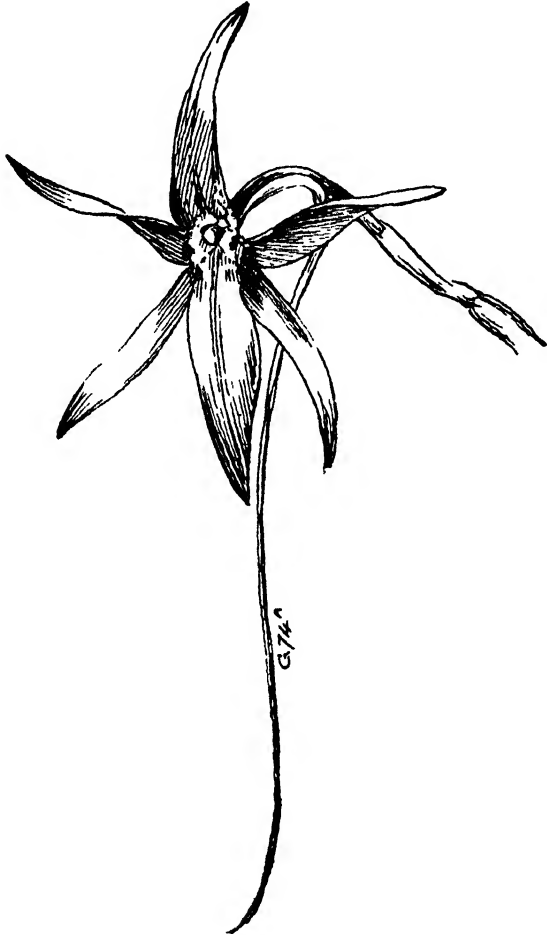


FIG. 105.—*ANGREECUM FILICORNU*. (*Gardeners' Magazine*.)

To *Cirrhopetalum chinense*, from Sir Trevor Lawrence, Bart. Umbel showy; flowers yellowish-white, the lateral sepals spotted with rose.

### Other Exhibits.

Messrs. F. Sander showed a group of *Dendrobium Phalaenopsis* and hybrid *Cypripediums*.

ORCHID COMMITTEE, JULY 31, 1900.

HARRY J. VEITCH, Esq., in the Chair, and fifteen members present.

**Awards Recommended:—**

*Silver-gilt Flora Medal.*

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a group of rare and excellently well-grown Orchids.



FIG. 106.—CATTLEYA 'F. W. WIGAN.' (*Journal of Horticulture*.)

*First-class Certificate.*

To *Cattleya* × 'F. W. Wigan' (*Schilleriana* × *aurea*) (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). Of the same general appearance as *C.* × *Whitei*, but exhibiting more of

the characters of *C. Schilleriana*. Sepals, light rose, tinged with bronzy yellow; petals rose colour; lip rosy-purple on the side lobes, yellow in the centre, and rose-veined with purple in front. (Fig. 106.)

*Award of Merit.*

To *Cattleya* × *porphyrophlebia* (*intermedia* × *superba*) (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). Flower in size equal to *Cattleya maxima*, white tinged with lilac and with purple markings on the lip.

To *Lælio-Cattleya* × 'Remula' (*L. tenebrosa* ♂ *C. Aclandiae* ♀) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. Sepals and petals yellowish tinged with brown; lip white at the base, dark rose on the front lobe.

*Botanical Certificate.*

To *Odontoglossum cruentum*, Reich, from the Royal Botanic Gardens, Glasnevin, Dublin. Flower small, yellow, and brown, and resembling a small *O. cristatellum*.

To *Cyrtopera plantaginea*, from the Royal Botanic Gardens, Glasnevin, Dublin. Inflorescence two feet in length. Flowers small; sepals greenish; petals white, hooded over the column; lip white, with purple markings.

To *Phaius bicolor*, from John T. Gabriel, Esq. Sepals, petals, and base of lip white; front of lip white, with rose-coloured margin.

**Other Exhibits.**

H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), showed *Cattleya* × *Hardyana*, 'Rosslyn variety,' and other Orchids.

Messrs. B. S. Williams, Holloway, staged a group of Orchids.

Messrs. Thomas Cripps, Tunbridge Wells, showed a group of *Disa grandiflora*.

A. H. Smee, Esq. (gr. Mr. Humphreys), sent *Bulbophyllum Sanderianum*.

Mr. Wm. Riches, Stamford Hill, sent a good form of *Lælio-Cattleya* × *elegans*.

De B. Crawshay, Esq. (gr. Mr. S. Cooke), showed *Odontoglossum* × *Hallio-crispum* *Crawshayanum*.

ORCHID COMMITTEE, AUGUST 14, 1900.

HARRY J. VEITCH, Esq., in the Chair, and eleven members present.

**Awards Recommended :—**

*First-class Certificate.*

To *Lælio-Cattleya* × 'Hermione' (*Cattleya Luddemanniana* × *Lælia Perrinii*) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. Flower of fine form, with deep purple rose on the petals and sepals, the lip being of rich crimson on the front portion, and pale cream within.

*Award of Merit.*

To *Cattleya Eldorado enfieldiensis* (votes, 6 for, 4 against), from Messrs. Hugh Low, Clapton. Flower white, with a yellow throat, and purple tip to the lip.

**Other Exhibits.**

Sir William Marriott, Down House, Blandford (gr. Mr. Denny), sent *Laelio-Cattleya* × 'Clonia,' Down House variety (*Laelio-Cattleya* × *elegans* × *Cattleya Warscewiczii*), a beautiful flower, distinctly showing the *Laelio-Cattleya* parent.

E. Bostock, Esq., Tixall Lodge, Stafford, showed *Cattleya Harrisoniana violacea*, the plant carrying nine fine flowers.

M. Florent Claes, Rue des Champs, Brussels, sent *Odontoglossum crispum*, var. *De Sadeleri*, a whitish flower with pale yellow margins and brown spots.

R. I. Measures, Esq., Cambridge Lodge, Flodden Road, S.E. (gr. Mr. H. J. Chapman), showed *Cattleya Patrocini* (C. Leopoldi × C. Lodigesii); also *Cattleya Warnero-Bowringiana*.

Rev. F. Paynter, Stoke Hill, Guildford (gr. Mr. W. H. Cook), sent *Cypripedium* × *Fairieano-Stonci*.

ORCHID COMMITTEE, August 28.

HARRY J. VEITCH, Esq., in the Chair, and twelve members present.

**Awards Recommended :—**

*First-class Certificate.*

To *Cattleya* × *illuminata* (parentage unrecorded) (votes, unanimous), from Mrs. Briggs-Bury, Bank House, Accrington (gr. Mr. Wilkinson). A close ally to C. × *Atlanta* (Leopoldi × *Warscewiczii*). Sepals and petals yellowish, tinged with rose. Side lobe of lip blush-white with ruby-crimson tips; front lobe ruby-crimson.

*Award of Merit.*

To *Odontoglossum* × *Adrianæ* 'Countess of Morley' (votes, 6 for, 8 against), from Captain Holford, Westonbirt (gr. Mr. A. Chapman). Flowers cream-white, with large brown blotches.

To *Laelio-Cattleya* × *elegans* 'J. Davis' (votes, unanimous), from Mr. H. A. Tracy, Amyand Park Road, Twickenham. A very large form, with pale rosy-lilac flowers, with bright carmine-purple lip.

To *Cattleya bicolor* (votes, 9 for, 2 against), from W. C. Walker, Esq., Winchmore Hill (gr. Mr. Geo. Cragg). A good plant of the typical form with four spikes of flowers was shown.

*Cultural Commendation.*

To Mr. A. Chapman, gr. to Captain Holford, for examples of *Dendrobium Phalaenopsis Schröderianum*, with from eighteen to twenty-two fully expanded flowers on the spikes.

To Mr. H. Bacon, gr. to W. W. Astor, Esq., Cliveden, Maidenhead, for a very large specimen of *Peristeria elata* with eight spikes of flowers.

**Other Exhibits.**

J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis), sent the fine *Lælio-Cattleya* × *Schilleriana*, 'Glebelands variety.'

Sir Wm. Marriott, Down House, Blandford (gr. Mr. Denny), sent *Cattleya* × *armainvillieriensis* (Mendelii × Warscewiczii).

Captain Holford (gr. Mr. A. Chapman) sent *Cypripedium* × 'Milo Westonbirt variety'; a bright yellow *Sobralia xantholeuca*, and a very large *Dendrobium formosum*.

Mr. Ed. Kromer, Bandon Hill, Croydon, showed *Cattleya aurea Jenseniana*.

Messrs. Hugh Low sent forms of *Cattleya Eldorado*, and *Cynoches chlorochilon*.

## ORCHID COMMITTEE, SEPTEMBER 11.

HARRY J. VEITCH, Esq., in the Chair, and ten members present.

**Awards Recommended:—***Award of Merit.*

To *Cattleya bicolor* 'Glebelands variety' (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). A fine form having the purplish-rose labellum edged with white. The large specimen shown had eleven spikes of flowers.

*Cultural Commendation.*

To Mr. H. Pratt, gr. to Arthur Hay, Esq., Oakley Park, Eye, Suffolk, for a fine specimen of *Vanda cærulea*.

To Mr. F. J. Thorne, gr. to Major Joicey, Sunningdale Park, for a fine plant of *Dendrobium taurinum amboinense* with three spikes.

To Mr. Jas. Hudson, gr. to Leopold de Rothschild, Esq., Gunnersbury, for *Dendrobium formosum giganteum* in flower, the plants exhibited having been raised from seeds imported with the parent plant in 1897.

**Other Exhibits.**

Captain Holford, Westonbirt (gr. Mr. A. Chapman), sent a three-flowered inflorescence of *Cattleya Dowiana aurea* in which all the flowers were different in the markings.

R. I. Measures, Esq., Camberwell (gr. Mr. H. J. Chapman), showed *Cypripedium* × 'Mrs. F. L. Ames,' and C. × 'Unxia' (*Harrisianum superbum* × *Lawrebel*.)

F. W. Moore, Esq., The Royal Botanic Gardens, Glasnevin, showed *Aganisia ionoptera* and *Bulbophyllum Reinwardti*.

Mr. Ed. Kromer, Bandon Hill, showed *Zygopetalum crinitum*.

Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Wm. Murray), showed *Cypripedium* × *Morganiae* 'Oakwood variety' and another hybrid.

De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. S. Cooke),

showed *Odontoglossum* × *Wattianum* *Crawshayanum* (*Lindleyanum* ♀ *Harryanum* ♂), interesting as proving the supposed parentage of the imported type; also *O.* × *Hallio-crispum roseum*.

Walter C. Walker, Esq., Winchmore Hill (gr. Mr. Geo. Cragg), staged a group of *Dendrobium Phalaenopsis Schröderianum*.

Messrs. F. Sander & Co. showed varieties of *Dendrobium Phalaenopsis Schröderianum*.

#### ORCHID COMMITTEE, SEPTEMBER 25, 1900.

HARRY J. VEITCH, Esq., in the Chair, and sixteen members present.

#### Awards Recommended :—

##### *Silver Flora Medal.*

To Messrs. James Veitch & Sons, Chelsea, for a remarkable group of hybrid *Cattleyas*, *Lælio-Cattleyas*, and *Cypripediums*.

#### Other Exhibits.

Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), showed *Lælio-Cattleya* × *bletchleyensis*, varieties of *L.-C.* × *callistoglossa* and other hybrids.

Henry Little, Esq., Baronshalt, Twickenham (gr. Mr. Howard), showed *Cattleya* × *Hardyana*, 'Little's variety,' *Cattleya* × *Mantini*, *Lælio-Cattleya* × *Sallieri*, and *L.-C.* × *velutino-elegans*.

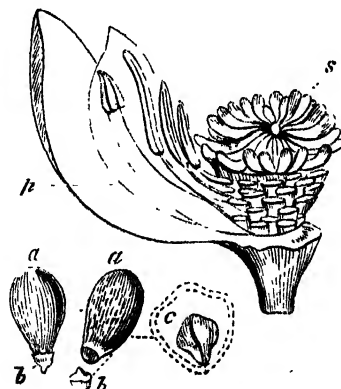
Sir James Miller, Manderston, Duns (gr. Mr. J. Hamilton), showed *Cattleya* × *Bowringiano-velutina*.

Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Wm. Murray), sent *Cattleya* × *Hardyana*, Oakwood variety, and *Cattleya* × *Lord Rothschild*.

F. A. Rehder, Esq., The Avenue, Gipsy Hill (gr. Mr. R. Norris), showed *Cypripedium* × *Mrs. Rehder* (*Argus* × *Rothschildianum*).

Messrs. Hugh Low & Co., Bush Hill Park, showed *Cattleya* × *Maroni*, *C. Gaskelliana alba*, and *Oncidium Papilio*.

Col. Shipway, Grove House, Chiswick (gr. Mr. Walters), exhibited a fine plant of *Vanda Sanderiana* with two spikes of flowers.



**NARCISSUS COMMITTEE.**

MARCH 13, 1900.

JOHN T. BENNETT-POË, Esq., in the Chair, and eight members present.

**Awards Recommended :—***Silver Banksian Medal.*

To Messrs. Barr, King Street, Covent Garden, for a group of Daffodils.

NARCISSUS COMMITTEE, MARCH 27, 1900.

The Rev. G. H. ENGLEHEART, M.A., V.M.H., in the Chair, and thirteen members present.

**Awards Recommended :—***Silver Flora Medal.*

To Messrs. Barr, for a group of Daffodils.

*Award of Merit.*To Daffodil 'Comet' (votes, unanimous), from R. O. Backhouse, Esq., Sutton Court, Hereford. A hybrid between *N. cyclamineus* and *N. obvallaris*.

NARCISSUS COMMITTEE, APRIL 10, 1900.

JOHN T. BENNETT-POË, Esq., in the Chair, and fifteen members present.

**Awards Recommended :—***Silver Flora Medal.*

To Messrs. Barr, for a group of Daffodils.

*Award of Merit.*

To Daffodil 'Double Campernelle' (votes, unanimous), from Messrs. W. Mauger, Guernsey. This was the true and very rare form of the Double Campernelle.

To Daffodil 'Alma' (votes, unanimous), from the Rev. G. M. Engleheart, M.A., V.M.H. A Citron-coloured Ajax, remarkable chiefly for its peculiar shade of yellow, which is said to be very rare.

NARCISSUS COMMITTEE, April 24, 1900.

JOHN T. BENNETT-POË, Esq., in the Chair, and fifteen members present.

**Awards Recommended :—***Silver Flora Medal.*

To Messrs. Bath, of Wisbech, for a group of Daffodils.

To Mr. H. Jones, Ryecroft, Lewisham, for a group of Daffodils.

To Messrs. Barr, King Street, Covent Garden, for a group of Daffodils.

To Messrs. J. Veitch, King's Road, Chelsea, for a group of Daffodils.

*First-class Certificate.*

To Daffodil 'Mrs. Berkeley' (Triandrus  $\times$  'Minnie Hume') (votes, 10 for), from Miss Willmott, Warley.

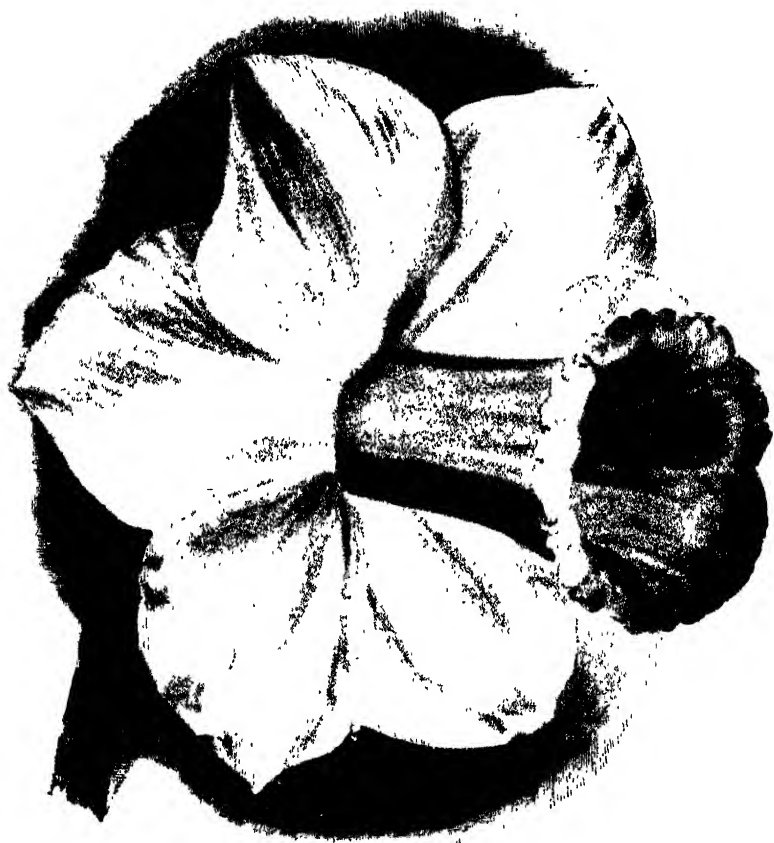


FIG. 107.—NARCISSUS 'DOROTHY KINGSMILL.' (*Journal of Horticulture*.)

To Daffodil 'Countess de Grey' (votes, 11 for, 1 against), from Miss Willmott.

To Daffodil 'Dorothy Kingsmill' (votes, 5 for, 4 against), from Mrs. Kingsmill. (Fig. 107.)

To Daffodil 'Van Waveren's Giant' (votes, 11 for), from Herr Van Waveren, Hillegom, Holland. (Fig. 108.)

*Award of Merit.*

To Daffodil 'Rev. C. Wolley Dod' (votes, unanimous), from Miss Willmott.

To Daffodil 'Eleanor Berkeley' (votes, unanimous), from Miss Willmott.

To Daffodil 'Diana' (votes, unanimous), from the Rev. G. H. Engleheart, M.A., V.M.H., Appleshaw, Andover.

To Daffodil 'Chancellor' (votes, unanimous), from Rev. G. Engleheart.

To Daffodil 'Virgil' (votes, unanimous), from Rev. G. H. Engleheart.



FIG. 108.---NARCISSUS 'VAN WAVEREN'S GIANT.' (*Journal of Horticulture.*)

To Daffodil 'Olympia' (votes, 12 for), from Heer Van Waveren. (Fig. 109.)

To Daffodil 'Minnie' (votes, 10 for), from Heer Van Waveren.

To Daffodil 'Wilhelmina' (votes, unanimous), from Heer J. de Groot, Noordwyk, Holland. (Fig. 110.)

It is remarkable that all the above Daffodils, except the four from Holland, were seedlings raised by the Rev. G. H. Engleheart, M.A., V.M.H., although several of them were not shown by him on this occasion.

NARCISSUS COMMITTEE, May 8, 1900.

A. KINGSMILL, Esq., in the Chair, and nine members present.

The Rev. G. H. Engleheart, V.M.H., brought three poeticus varieties : 'Spenser,' a variety of good size and substance, with broad red eye, bringing the red-eyed poeticus down to *P. recurvus* and the later poeticus section in date of bloom, a smaller, neat, red-eyed variety, 'Rondo ;' and



FIG. 109.—NARCISSUS OLYMPIA. (*Gardeners' Magazine.*)

'Sonnet,' a circular flower with large yellow eye, rimmed red. The Committee desired to see these flowers again in larger quantity.

From Miss K. Spurrell, Blessingham, Hanworth, Norwich, came several seedlings, one of which, 'Major Spurrell,' has considerable merit—a large flower with white perianth and broad, red-edged eye, of nearly poeticus-like flatness. The specimens were past their best, and the Committee desired to see the flower again. As the regulation number

of three flowers was not sent, the Committee asked that these seedlings might be submitted on a future occasion.

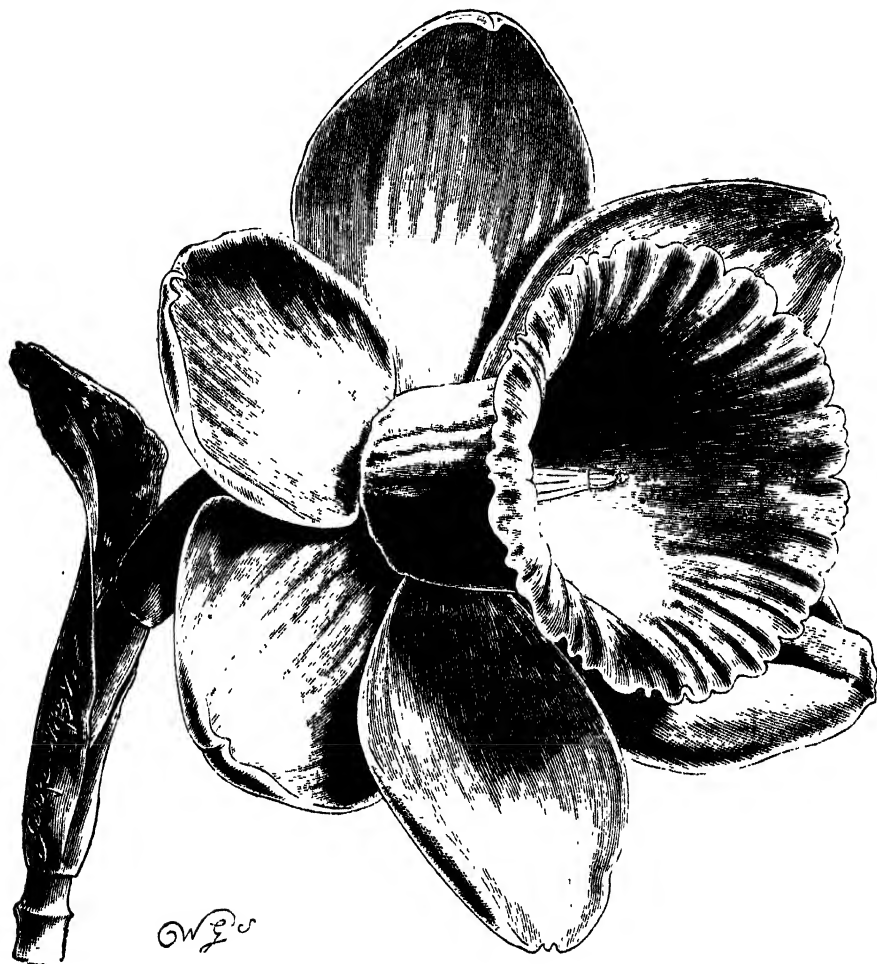
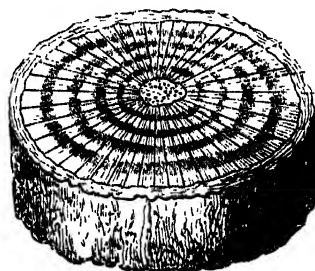


FIG. 110.--NARCISSUS 'WILHELMINA.' (*Gardeners' Chronicle*.)

Messrs. Barr & Sons brought a large poeticus 'Glory,' but the flowers were so much out of condition that the Committee asked to see it again.



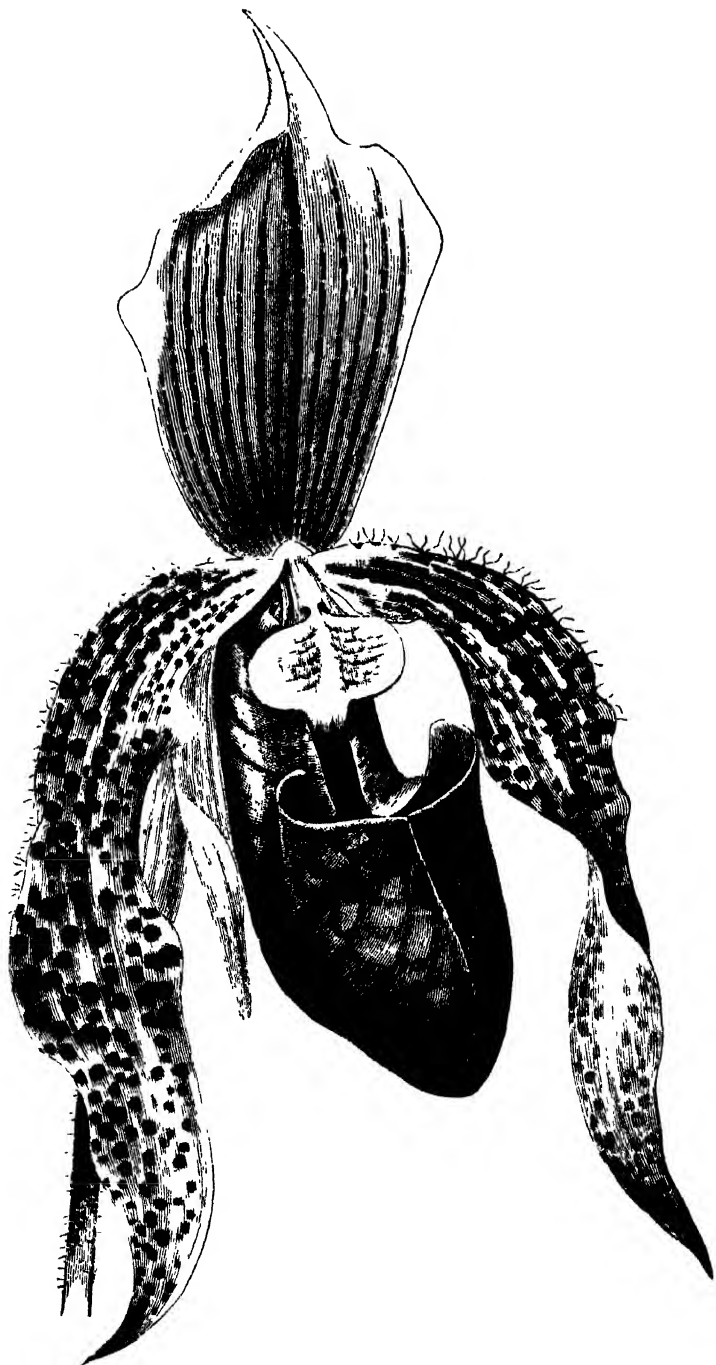


FIG. 111.—CYPRIPEDIUM SANDER-SUPERBIENS. (*Journal of Horticulture*.)

## FELLOWS' PRIVILEGES OF CHEMICAL ANALYSIS.

(Applicable only to the case of those Fellows who are not engaged in any Horticultural Trade, or in the manufacture or sale of any substance sent for Analysis.)

The Council have fixed the following rates of charges for Chemical Analysis to Fellows of the Society being *bonâ fide* Gardeners or Amateurs.

These privileges are applicable only when the Analyses are for *bonâ fide* horticultural purposes, and are required by Fellows for their own use and guidance in respect of gardens or orchards in their own occupation.

The analyses are given on the understanding that they are required for the individual and sole benefit of the Fellow applying for them, and must not be used for the information of other persons, or for commercial purposes.

Gardeners when forwarding samples are required to state the name of the Fellow on whose behalf they apply.

The analyses and reports may not be communicated to either vendor or manufacturer, except in cases of dispute.

When applying for an analysis, Fellows must be very particular to quote the number in the following schedule under which they wish it to be made.

No.

1. An opinion on the purity of bone-dust (each sample)	2s. 6d.
2. An analysis of sulphate or muriate of ammonia, or of nitrate of soda, together with an opinion as to whether it be worth the price charged	5s.
3. An analysis of guano, showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, together with an opinion as to whether it be worth the price charged	10s.
4. An analysis of mineral superphosphate of lime for soluble phosphates only, together with an opinion as to whether it be worth the price charged	5s.
5. An analysis of superphosphate of lime, dissolved bones, &c., showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime and ammonia, together with an opinion as to whether it be worth the price charged	10s.
6. An analysis of bone dust, basic slag, or any other ordinary artificial manure, together with an opinion as to whether it be worth the price charged	10s.
7. Determination of potash in potash salts, compound manures, &c.	7s. 6d.
8. An analysis of compound artificial manures, animal products, refuse substances used for manure, &c.	from 10s. to £1
9. An analysis of limestone, showing the proportion of lime	7s. 6d.
10. Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	10s.
11. Complete analysis of a soil	£3
12. Analysis of any vegetable product	10s.
13. Determination of the "hardness" of a sample of water before and after boiling	5s.
14. Analysis of water of land-drainage, and of water used for irrigation	£1
15. Analysis of water used for domestic purposes	£1 10s.
16. Consultation by letter	5s.

Letters and samples (postage and carriage prepaid) should be addressed to the Consulting Chemist, Dr. J. AUGUSTUS VOLCKER, 22 Tudor Street, New Bridge Street, London, E.C.

The fees for analysis must be sent to the Consulting Chemist at the time of application.

Instructions for selecting, drawing, and sending samples for analysis will be found on page 30 of "Arrangements, 1900," or can be obtained on application to the Society's Office, 117 Victoria Street, S.W.

## NOTICES TO FELLOWS.

NOVEMBER 1900.

### FRUIT.

Grapes: Fellows can now obtain Gros Colmar Grapes at 1s. 6d. to 2s. 6d. a lb., according to size and quality. Carriage will be charged extra as follows: 1 lb. 4d., 2 lb. 5d., 3 lb. 6d., 4 lb. 7d., 5 lb. 8d. Apples, both Cooking and Dessert, may be ordered at prices according to size and variety. Orders for Fruit should be addressed *Superintendent, R.H.S. Gardens, Chiswick, W.*, and must be accompanied by Cheque or Postal Order to secure attention.

### LETTERS.

All letters on all subjects (save above) should be addressed—Secretary, R.H.S. Office, 117 Victoria Street, Westminster, S.W.

### TELEGRAMS.

“**HORTENSIA, LONDON,**” has been registered, and is sufficient address for all telegrams.

### FELLOWS' PRIVILEGES OF CHEMICAL ANALYSIS, &c.

Full instructions are contained in “Arrangements” for the current year, and an epitome thereof will be found on page clxv of this volume.

### PLANTS CERTIFICATED.

A list of all the Plants, Fruits, Flowers, Vegetables, &c., certificated by the Society up to January 1, 1900, has just been published, price 5s. The section devoted to Orchids, interleaved with lined foolscap and bound in cloth, can be obtained for Fellows by special order, price 5s.

The compilation of this volume has entailed an enormous amount of labour and research, and it is hoped that many Fellows will purchase a copy, not merely for the value of the information it contains, which, however is very great, but also in order to take a small share in the very considerable expense necessarily incurred in the publication of such a work. It can be obtained by Postal Order from the Society's Office, 117 Victoria Street, Westminster.

## NEW FELLOWS.

The Centenary of the Society in March 1904 is fast approaching, and the Secretary is most anxious to double the number of Fellows before that eventful date. Will every Fellow assist him by sending in the name of at least one new Fellow during the coming year?

## LECTURES, &c.

Any Fellows willing to Lecture or to communicate Papers on interesting subjects are requested to communicate with the Secretary.

## MEETINGS AND SHOWS.

1900, November 20; December 4, 18. 1901, January 15, 29; February 12, 26; March 12, 26; April 9, 23; May 7; 22, 23, 24 (Temple); June 4, 18; July 2, 16 (Conference on Lilies), 30; August 13, 27; September 10, 24; October 10, 11, 12 (Crystal Palace); 15, 29; November 12, 26; December 17. A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Office, 117 Victoria Street, S.W., a sufficient number of halfpenny cards *ready addressed* to himself.

## SUBSCRIPTIONS.

All Subscriptions fall due on January 1 of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

## DISTRIBUTION OF PLANTS, &c.

Fellows are particularly requested to note that a list to choose from of all the plants available for distribution is sent every year to every Fellow enclosed in the "*Report of the Council*" in the last week in January of each year, and a ballot for order of being served is made on March 1. The distribution begins on March 1. Fellows having omitted to fill up their application form before May 1 must be content to wait till the next distribution. The work of the Gardens cannot be disorganised by the sending out of plants at any later time in the year.

## DRACÆNAS.

The Superintendent, R.H.S. Gardens, Chiswick, W., would be greatly obliged for any old plants of *Dracænas*, however old and long. Please shake out all the earth from the roots and send direct.

## CHISWICK TRIALS, 1901.

The following are the subjects selected for trial next year, together with the number of each variety which is requested to be sent to the Gardens :—

*Verbenas.* Six plants of each.

*Hybrid Tea and Hybrid China Roses.* Two plants of each.

*Delphiniums.* Three plants of each.

*German Iris.* Three plants of each (may be sent at once, or in July 1901).

*Peas (edible), New.* Half-pint of each.

*Potatos, New.* Twenty tubers of each.

*Summer and Autumn Cabbages.*  $\frac{1}{2}$  oz. of each.

*Saladings.*  $\frac{1}{2}$  oz. of each.

Any of the above should be sent before February 1, 1901, addressed, Superintendent, R.H.S. Gardens, Chiswick, London.

## ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may indirectly be benefited. An Index to the Advertisements will be found on *Advertisement* page 36.



# EXTRACTS FROM THE PROCEEDINGS

## OF THE

### ROYAL HORTICULTURAL SOCIETY.

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#### GENERAL MEETING.

OCTOBER 9, 1900.

Mr. JOHN T. BENNETT-POE in the Chair.

*Fellows elected* (32).—J. J. Allen, H. A. Attenborough, J.P., Arthur L. Bacon, Mrs. Bacon, Mrs. Badcock, Lady Barbour, Mrs. Bolding, Albert Broadbent, Caleb A. Campbell (Jamaica), J. Chatham, F. Crawford Cobb, Mrs. E. J. Astley Cooper, Miss Duncombe, Miss A. Kathleen Dundas, Miss Charlotte Egerton, James Fairlie, Edward John Fellowes, Mrs. Ernest Hart, R. David Hughes, Miss Douglas Baird Jackson, Alfred H. Johnson, Robert Kidston, A. Leatham, Ernest Moon, J. A. Rogers, Hon. Mrs. Alfred Talbot, George H. Varley, Frank Walkinshaw, George F. Spencer Warne, Miss Waterfield, Henry L. Wethered, Mrs. A. Williams Wynn.

A lecture on "Figs in Pots" was given by Mr. James Hudson, V.M.H. (See page 281.)

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#### GENERAL MEETING.

OCTOBER 23, 1900.

Mr. A. H. PEARSON in the Chair.

*Fellows elected* (30).—R. Allman (Southern Nigeria), W. A. Beach, Charles Bethell, Mrs. John Blair, Mrs. E. M. Boxall, Mrs. Lucas Cobbold, Mrs. N. F. Cobbold, Mrs. Courage, George Crabb, Mrs. Augustus Durant, Miss Jane Easterbrook, J. B. Fortescue, Mrs. Fortescue, Frank Galsworthy, Thomas W. Garnham, Miss Mary H. Gillett, Charles J. Harper, Mrs. Charles Hay, A. W. Heppel, Mrs. H. Lightbody, William W. Mann, George O. Nicholson, Lewis H. Page, H. Partridge, R. C. Pulling, Col. C. M. Royds, M.P., Hon. Mrs. Surgison, Mrs. Stallard, Mrs. Thorneycroft, Arthur Verschoyle.

*Society affiliated* (1).—New South Wales (Australia) Horticultural Association.

A lecture on "Mistakes in Orchard Management" (illustrated by lime-light) was given by Mr. John Ettle, F.R.H.S. (See page 256.)

GENERAL MEETING.

NOVEMBER 6, 1900.

Rev. W. WILKS, M.A., in the Chair.

*Fellows elected* (14).—Hayward John Bidwell, Lady Blythwood, Frederick Garrett, Henry Knott, J.P., Richard Lonsdale, T. B. Miller,



FIG. 180. LILIO-CATTELYA NYSA. (*Journal of Horticulture*.)  
Exhibited by Messrs. James Veitch, September 25. See page clviii.

Hon. Mrs. Mure, J. Parkin, M.A., Rev. Francis Russell Rawes, John Roberts, William Pole Routh, William Ware, Miss Beatrice A. Wilbraham, Albert Wright.

A lecture on the "Black Currant Mite" was given by Mr. Robert Newstead, F.E.S. (See page 286.)

## GENERAL MEETING.

NOVEMBER 20, 1900.

Mr. A. H. PEARSON in the Chair.

*Fellows elected* (20).— Miss Adamson, S. C. Banerjee (India), John Hall Barron, Mrs. A. H. Brown, Mrs. Francis Cooper, George Cooper



FIG. 181.—*THELADIANTHA DUBIA*. (*Journal of Horticulture*.) See p. lx.

(New Zealand), John Craig (United States, America), Miss Maud Culleton, Robert Dean, Lady Kelvin, Mrs. Knox, Mrs. F. G. Lloyd, Miss Lloyd, Miss V. A. Lloyd, Frederick McTier, Capt. Savile G. Reid, George Roberts, Thomas Sharp, Capt. William Waring, James Wicks.

*Associate* (1).—G. Carpenter.

A lecture on "Mistakes in Fruit Culture" was given by Mr. George Bunyard, V.M.H. (See page 317.)

## GENERAL MEETING.

DECEMBER 4, 1900.

Mr. HENRY J. PEARSON in the Chair.

*Fellows elected* (17).—Frederick Thomas Allen, B.Sc., Dr. Henry Bond, Thomas Bristow, William E. Brooks, Rev. F. R. Burnside, Mrs. Adele Campbell of Stonefield, Miss Eleanor Fell, George Campbell Giffard, C. W. Kitson, George L. Morgan, R. Morrow, Mrs. Howard Norton, H. H. Palairot, J.P., B. Shearn, Arthur W. Wade, C. J. Wakefield, Ernest Waller (North Africa).

A lecture on "The Heating and Ventilation of Glass Houses" was given by Mr. A. Donald Mackenzie. (See page 323.)

## GENERAL MEETING.

DECEMBER 18, 1900.

Mr. OWEN THOMAS, V.M.H., in the Chair.

*Fellows elected* (32).—Major W. Anstruther-Thomson, William Badcock, R. Leatham Barclay, Viscountess Baring, Rev. Wynter E. Blathwayt, George W. W. Blathwayt, Samuel Cooper, Alberto Côrtes, C.B. Cranstoun, M.B., Mrs. Des Vœux, Viscountess Duncannon, W. F. Egerton, C. Greenrod, Prof. Percy Groom, F.L.S., Thomas A. Hewitt, Harold W. Humphries, Chas. S. King, Edward Leigh-White, J.P., Sydney Morris, Edward P. Newman, Mrs. Paley, W. G. Parkes, John Percival, F.L.S., Mrs. Mary Pipkin, Edw. Robotham, E. B. Rodway, F. W. Searle, Robt. W. Swan, W. P. Thomson, S. A. Went, Mrs. W. A. Wills, Earl of Yarborough.

*Associate* (1). David K. Lumsden.



## SCIENTIFIC COMMITTEE.

The following matters have been dealt with during the summer recess :

*Asparagus, Diseased.*—Specimens badly diseased were received from Mr. G. Croft Harris, Upton-on-Severn, and submitted to Dr. W. G. Smith, who reports as follows :—

“The plant of *Asparagus* received is badly attacked by the *Asparagus* rust-fungus *Puccinia asparagi*, DC. The stems are studded with dark spots, oval in shape, and some as long as one-eighth of an inch. Examination showed the characteristic two-celled ‘teleutospores,’ or winter-resting spores, with a thick dark brown coat; the spots seen on the stem are compact patches of these spores. The fungus filaments live inside the tissues of the *Asparagus* plant. The life-history of this *Puccinia* agrees closely with that of Mint-rust, *Puccinia menthæ*. The young shoots of *Asparagus* in early summer bear tiny cups, from which a form of spore (ecidiospore) is given off; later in the season brown spots on the plant give off a second form of spore (uredospore); in late summer or autumn appears the third form in the shape of dark brown patches of teleutospores, as in the plant sent. In considering a remedy, it is important to bear in mind that these teleutospores rest through the winter, and next season infect young plants. Operations must therefore be directed towards gathering and burning all the old stems as soon as possible, and before the spores have time to be scattered about. At the same time all weeds or other matter likely to harbour the spores during winter may be gathered and burned. Quicklime may also profitably be dug into the upper soil in as large a quantity as may be considered safe for the crop; and while the plants are dormant, spraying with diluted Bordeaux Mixture has been fairly successful as a check to the rust, but the delicate nature of *Asparagus* foliage makes this risky, and further experiments are required.”

*Asters, Diseased.*—Examples were sent by Mrs. E. Daw, of Nymett House, Nymett Rowland, Lapford, North Devon, observing that “the whole bed looked in splendid condition, but one after another nearly every plant went off, and in only a very few hours seemed quite withered and dead. Another garden in this neighbourhood has suffered in the same way, and French Marigolds have also been similarly attacked.” They appeared to be attacked by a worm called *Enchytræus parvulus* (Fig. 182), which is thus described by the Rev. Hilderic Friend in the *Gardeners' Chronicle* of August 14, 1897: “The worm is 3 to 5 mm. in length, or about one-eighth of an inch. It is therefore the smallest species known to science, since Tauber's *E. minutus* is insufficiently described and cannot be certainly identified. Viewed under a pocket lens, it is white or silvery, and when seen under the microscope the first six or seven segments are pellucid, while the remainder of the worm's intestinal organs are covered with dark cells. The character by which it

may be most readily distinguished by the microscopist who is not a specialist in worms is the number and arrangement of the setæ. As in other oligochaets, there is an entire absence of setæ, or bristles, on the first segment; while on the twelfth segment, which bears the girdle or clitellum, and the male-pores, the ventral bundles are missing. All the other segments, of which there are thirty in an adult worm, bear four bundles of setæ, of which two bundles are lateral and two ventral. In the first eighteen segments, or thereabouts, there are three setæ in each ventral bundle, and two in each lateral; but in the last ten or twelve segments each bundle, ventral and lateral alike, has three setæ. Thus the bundles are all either couples or triplets, and the order and arrangement are definite, not irregular or promiscuous. There is a large head-pore between the prostomium and the first ring, *i.e.* the one without setæ, and when a little pressure rests upon the worm's body, the fluid and particles contained within the coelomic cavity and head are poured out of this aperture, thus relieving the pressure. The brain is somewhat pear-shaped, rounded off, or convex at the hinder margin, and there is a slight tendency on the part of the ventral nerve-cord to broaden between the third and fourth segments. The blood-vessels and other parts are of

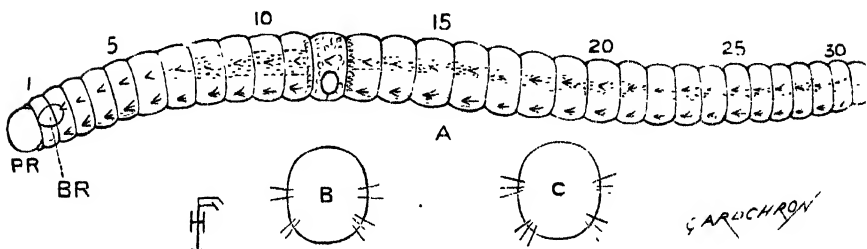


FIG. 182. — ASTER-WORM, ENCHYTRÆUS PARVULUS (*Gardener's* 'Chonule').

the usual type: the girdle is slightly papillose, and accompanying the pores on the twelfth segment are somewhat large vase-shaped glands.

"It will at once be seen that the worm comes very near to *E. argenteus*, Michaelsen, and it seems likely that the British and German forms may be ultimately referable to the same species. In that case the name *parvulus* will be withdrawn.

"Curiously enough, though the fact has been more than once referred to since, our great authorities on this group of annelids make no allusion to the predatory life of the worms belonging to this genus or order. I have frequently examined white worms belonging to the Enchytraideæ, which were living on the roots of plants; and have notes of more than one species new to science which were infesting grass crops, so that it may be regarded as a well-established fact that the white worms belonging to the genus *Enchytraeus* and its allies are destructive to plants.

"My observations confirm those of Mr. Harker. The minute worm obtains admission to the roots and rootlets, and lodges under the epidermis, where it sucks the juices of the plant, or even (as microscopic examination shows) breaks up its cell structure and swallows the vegetable tissues, thus preventing the plant from sending moisture and nutriment through the stem to the leaves. Though the worms have no teeth, their

mouths act as suckers, and they very quickly divert the nutriment from the ordinary channels to their own œsophagus, to the ruin of their host.

"Naturally enough it will be asked, 'What is the remedy?' It must not be assumed that all decaying Asters are eaten of worms. If, however, the lens reveals their presence, drastic measures must at once be adopted. If it were possible, the moment sickness showed itself, to lift the plant, excise the injured part and reset it, the evil might be arrested. There would, however, still be two dangers. The plant might be unable to recover; and if it did, the eggs of the worm, which are infinitely small, and would never be detected, may have been deposited in the tissues. This being so, young worms would soon appear again, and the plant succumb after all. The only way to insure the destruction of the pest when once in the plant is to uproot every sickly individual and consign it instantly to the flames."

*Willows attacked by Aphis*.—Rev. H. C. Brewster, of South Kelsey, Lincoln, sent specimens of Willow shoots infested with aphis. He observes that the Willow trees swarm with wasps. Mr. McLachlan, F.R.S., reports that the insects on the Willows were a large species of aphid known as *Lachnus viminalis*. They secrete quantities of "sugar," which attracts innumerable wasps. It has actually been suggested in former times that this "sugar" might be utilised when the real article is scarce.

*Oak-leaves with Spangles*.—Some leaves, extraordinarily and thickly covered with spangles, were sent by Mr. Winkworth, of Haughton Hall, Tarporley. Mr. McLachlan, F.R.S., observes that nothing can be done, but that tomtits devour them. They are not likely to cause any permanent injury. Pheasants are also said to be fond of them.

*Cystopteris bulbifera*.—Specimens of the curious bud-like structures from the tips of the fronds of this Fern were sent by Mrs. W. Floyer, of Richmond Road, Basingstoke. They consist of two or three unequal-sized thick and fleshy scales; the cells are green, but contain immense quantities of starch.

#### SCIENTIFIC COMMITTEE, NOVEMBER 6, 1900.

Dr. M. T. MASTERS, F.R.S., in the Chair, and two members present, with Mr. W. Fawcett, Director of the Public Gardens and Plantations, Jamaica.

*Oaks in Woods at Shirley*.—Mr. Wilks exhibited various specimens of Oak-leaves. The prevailing English Oak of the woods of north-east Surrey is *Quercus robur* var. *pedunculata*, the leaves of which run into a great variety of forms, according to the amount of development or arrest of the interstitial tissue between the ribs. A second kind closely resembles the leaf of the Turkey Oak, *Q. Cerris*, or the moss-cupped Oak. Others appear to be hybrids between *Q. Cerris* and *Q. rubra* and also *Q. r. pedunculata*. Two trees were observed having leaves characteristic of the American *Q. coccinea*. This tree apparently never bears acorns in this country.

*Castanea vesca, Foliage*.—Dr. Masters showed (from Mr. Burbidge)

some remarkable leaves of the Sweet Chestnut, consisting of but little more than the midribs, which had issued from the stump of a tree which had been cut down. He observed that the narrow-leaved variety grown in parks probably originated in this way.

*Proliferous Apple-shoot*.—Dr. Masters also exhibited a specimen of this well-known phenomenon, in which the leafy shoot appeared to penetrate right through the centre of the Apple and then proceed to a length of upwards of a foot beyond it. It is due to the floral bud being replaced by a leaf bud within the "pseudo-fruit," the Apple being really of the nature of a stem in which the pistil is embedded.

*Leaf-cutter Bees' Nest*.—Specimens of these cells made of portions of leaves were sent by Mr. Thos. Crosswell, Homewood, Eden Park, Beckenham. He describes the formation of these leaf-cells as follows: "After our Freesias had finished flowering and died down, the sticks that had been used for their support around the sides of the pots were removed, to facilitate their being placed on a shelf in the full sun. The bees took possession of the holes left by the removal of the sticks, and on turning out the pots of bulbs in August many of these cells were found."

#### SCIENTIFIC COMMITTEE, NOVEMBER 20, 1900.

A. D. MICHAEL, Esq., F.L.S., in the Chair, and five members present.

*Oak-leaves*.—Rev. W. Wilks showed additional specimens illustrating the great diversity in the lobing of the leaves. One specimen was pectinate, and without examination could hardly be distinguished from a frond of *Blechnum Spicant*.

*Dimorphic Orchid*. Mr. Harry J. Veitch showed a spike bearing flowers like those of *Odontoglossum crispum* on the upper half of the spike, and blooms of *O. Wilckeanum* below. The specimen came from Mrs. Briggs-Bury, Bank House, Accrington. The inference is that the two-fold character may be due to the dissociation of hybrid characters. The plant was referred by Mr. Rolfe to *Odontoglossum Denisonæ*.

*Diseased Peas from Broughty Ferry*.—Dr. William Smith reported that "the specimens sent were attacked by the Pea-mildew, which showed as a white mould on all parts; later, after the material dried up, numerous black winter-fruits of the Erysiphæ group of fungi confirmed the earlier observations. The species is probably *Erysiphe Martii*, Lev., although an almost similar species is also said to attack Peas. In the summer of 1899 I found the same disease, accompanied by the same fungus, on garden Peas in the Lothians, near Edinburgh. Flowers-of-sulphur, thoroughly dusted on with a sulphur puff or bellows, would check it. Spraying with Bordeaux Mixture will be more effective, but the low value of the crop raises the question whether it would pay to spray the plants several times each season."

It was stated that in some districts the cultivation of late varieties of Peas was given up owing to the excessive prevalence of mildew.

*Fruits of Pyrus japonica*.—Mr. Divers brought from the Duke of Rutland's gardens at Belvoir fruits of this species. Mr. Hudson

remarked that they made very good jelly. Dr. Masters said that the fruits of *P. Maulai* were even better for that purpose.

*Pea with a double Plumule.*—Mr. Cuthbertson sent a germinating Pea in which there were two cotyledons, and a radicle as usual, but the

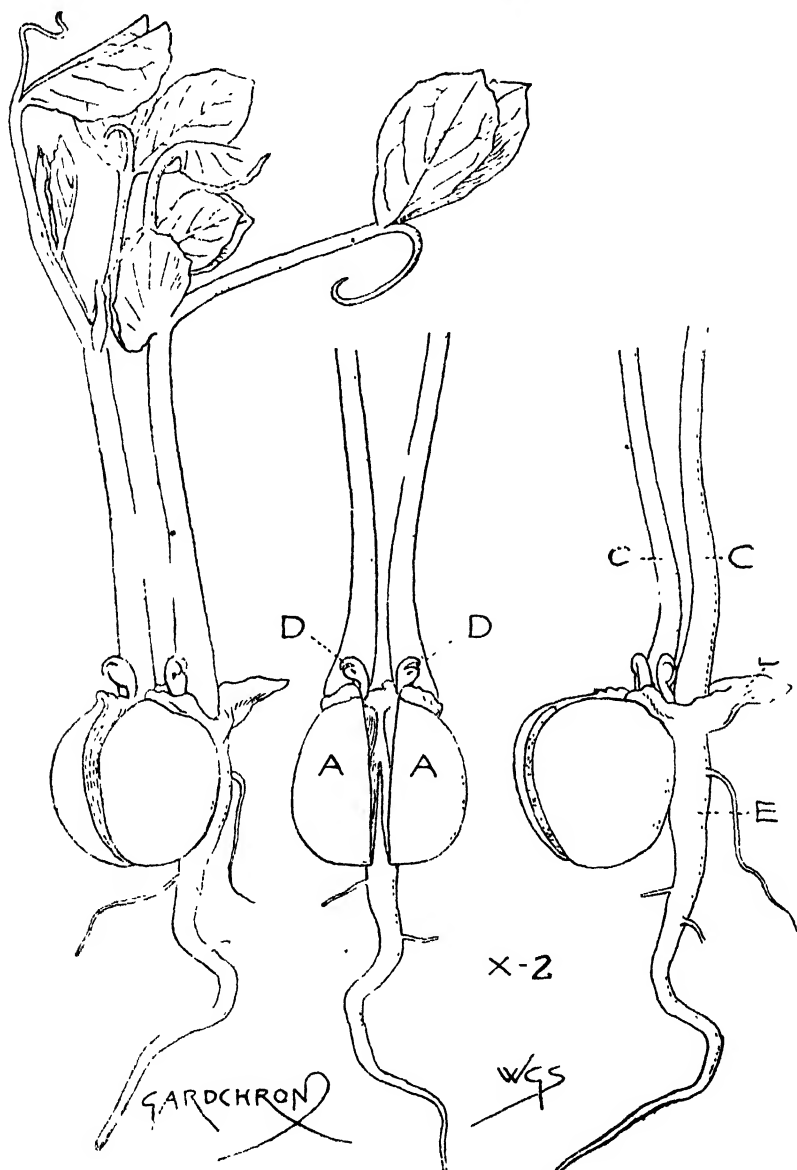


FIG. 183.—PEA SEEDLING WITH DOUBLE PLUMULE. (*Gardeners' Chronicle*)

plumule, instead of being single, was double (Fig. 183). Dr. Masters remarked that seeds with more than one embryo were not uncommon, but that he had failed hitherto to discover any record of one single seed with a double plumule. Dr. Masters pointed out that the radicle was somewhat fleshy, but normal in form. The two cotyledons (A, A) were

also normal. Each was provided with a short deflexed petiole. Connecting the base of one petiole to the other was a collar or thin almost membranous ring encircling the base of the epicotyl or plumule and prolonged on one side into a tongue-like process (B) similar to that which occurs among the Cucurbitaceæ,\* but differing from it in protruding on the opposite side of the embryo plant, opposite to or away from the base of the cotyledons, not directed towards them.

The hypocotyl, or, as it was originally called, the tigellum or caulicle, was not obvious externally, but no doubt this sheath-like process emerges from the axis at the junction between the radicle and the caulicle.

Traces of the sheath may be seen in germinating Peas, but I have never seen it so marked as in the present instance. Two plumules (epi-

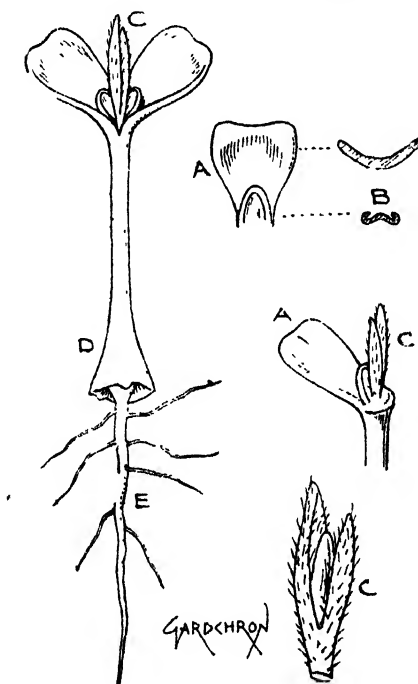


FIG. 184.—SEEDLING OF *LEUCADENDRON ARGENTEUM*. (*Gardener's Chronicle*.)

A A, Cotyledons sheathing at the base ; D D, Transverse sections ; C, Plumule ; D, Caulicle ; E, Radicle.

cotyls) arise from within this sheath (C, C) ; but whether the two are really distinct in their origin, or arise from the subdivision of one, I am not able to say. At the base of each is a small bud (D).

SCIENTIFIC COMMITTEE, DECEMBER 4, 1900.

C. E. SHEA, Esq., in the Chair, and four members present.

**Seed-vessels.**—Her Grace the Duchess of Cleveland sent fruits of the following plants: *Arauja albens*, fruit consisting of two thick oblong

\* Flahault, *Bull. Soc. Bot., France*, xxiv., 1877, p. 201 ; Darwin, *Movements of Plants*, p. 102 ; Lubbock, *A Contribution to our Knowledge of Seedlings* (1896), p. 161.

follicles; *Mandevilla suaveolens*, fruit of two long, narrow, slender follicles; *Stauntonia latifolia*, fruit a long, thick, oblong obtuse berry; *Cercis siliquastrum*, with legumes like those of a pea, but compressed; *Magnolia Soulangeana*, a long cluster of follicles, bursting, and revealing a seed covered with an orange-red investment.

*Weeping Chrysanthemum* 'Pioneer.'—This was one of eleven seedlings from a cross between 'Eva Knowles' and 'Viscountess Hambledon', raised by Mr. Austen, Ditton Court, Maidstone. The peculiarity of all eleven plants consisted in the downward geotropic direction of the branches, which were bent downwards like those of a Weeping Ash, but upturned heliotropically at the ends, when flowers are produced. This peculiar habit would render the plant very useful for certain decorative purposes. No cause can be assigned for the drooping tendency.

*Double Cyclamen*.—Some remarkable flowers were sent by Mr. Ker, of Liverpool, on which Dr. Masters undertook to report.

*Germination of Leucadendron*.—Dr. Masters showed a drawing (Fig. 184) of seedlings raised by him, presenting a curious outgrowth from the caulicle (hypocotyl), similar to that in the Pea shown on the last occasion. He remarked that some seedlings of the Silver Tree of the Cape, *Leucadendron argenteum*, were raised by him some years since in a cool greenhouse. They were remarkable for the membranous fold or sheath projecting downwards from the base of the caulicle (hypocotyl). The draughtsman has by an oversight shown the radicle proceeding from the centre of the sheath, but in reality it came from the side.]

#### SCIENTIFIC COMMITTEE, DECEMBER 18, 1900.

Dr. M. T. MASTERS, F.R.S., in the Chair, and four members present.

#### Awards Recommended :—

##### *Botanical Certificate.*

To *Kleinia pendula* (votes, unanimous), from Mr. R. Irwin Lynch, Botanic Gardens, Cambridge.

To *Kalanchoe marmorata* (votes, unanimous), from Mr. Lynch.

To *Nematanthus longipes* (votes, unanimous), from Mr. Lynch.

*Quercus sessiliflora*.—Mr. Wilks showed leaves with petioles, and sessile acorns of this variety, and remarked upon its rarity in the woods of north-east Surrey. He had only met with two, but they were very handsome trees, about 100 yards apart, and probably 150 years old. He observed that this form of the Oak keeps its leaves longer than *Q. pedunculata*, which is the commoner of the two varieties. The leaves are inclined to be tomentose below, giving a silvery appearance. Sir J. D. Hooker, in the 'Student's Flora,' records this character as belonging to *Q. intermedia*, a subspecies with short petioles and peduncles. Dr. Masters remarked upon the scarcity of *Q. sessiliflora* in Kent, but that it formerly, and perhaps still, grows at Brockley.

*Maclura aurantiaca*, Fruit.—An unripe fruit of this American tree was sent by Mr. Jas. Vert, of the Gardens, Audley End. It is known as the Osage Orange, and is a native of the south U.S.A., it is allied to the

Mulberry, and, like that, has a compound globular fruit. The tree, being spinescent, is often kept dwarf, and employed as a hedge plant. The golden fruit, about the size of an Orange, is not edible.

*Fruit from old Melon-seed.*—Mr. T. Sharp, Westbury, Wilts, describes his experience in raising Melons from old seed as giving better results than from young seed. His observations, which entirely confirm those of previous observers, are as follows:—"In a small Melon-house I noticed two plants which were very vigorous, and survived the first crop. They produced a good second crop of female flowers, but somewhat smaller, as were the male flowers, than usual. In the same house was a batch of young plants with good male blossoms. I fertilised the females of the older plant with the pollen from the younger. The crop of fruit was nearly double that of the first. The fruits were large and of excellent quality throughout. A year or two afterwards, having to supply ripe Melons in May and onwards, and having noticed that plants from old seed produced a less succulent growth than did those from young seed, for four years I raised my plants from old seed, always growing a few plants from new seed. I then fertilised the female flowers of the older plants with the pollen of the younger, which plants were invariably the more robust. The resulting fruits were more reliable in good quality, and though the female flowers had been small, the fruits were large, weighing from 3 to 7 lb." Professor Henslow has given very similar experiences on the Continent in his "Origin of Floral Structures," page 247. M. F. Cazzuola, in addition, found that Melon-plants raised from fresh seeds bore a larger proportion of male than female flowers; while older seed bore more female flowers than male.

*Ornithogalum lacteum.*—Mr. Veitch brought a beautiful spike of this plant in full blossom. It was especially interesting as having been cut in S. Africa from Table Mountain on November 27. It was then put into the refrigerating chamber of a ship on the 28th, and thus lasted exactly three weeks in a perfectly fresh state, illustrating the possibilities of the transport of cut blossoms from the colonies.

*Seakale, Defective.* - Mrs. A. Williams, of Coed-y-Marn, Welshpool, sent samples of Seakale: they were thin, and carried numerous buds on the crowns. This was considered to be the result of defective soil, described as a stiff one, and damp, imperfect nourishment, and neglect in removing the superfluous buds, instead of leaving one only in which the energy should be concentrated.

*Elm-trees at Bath Dying.*—Mr. Milburn, Superintendent of the Botanical Gardens, Victoria Park, Bath, records the dying of some five Elms:—"The trees were planted between fifty and sixty years ago. They form part of a line which still remain apparently healthy. The trees in question are situated on the base of a sloping bank running E. and W. On the south side is a stone wall from 6 to 8 feet in the foundations. The subsoil is blue clay. Consequently the trees have root room only on one side. Moreover, the last two or three seasons have been very dry. In addition to this a destructor has been erected 200 yards off; also close at hand are the gasworks. Matter is conveyed in the air from both these works, as it is deposited in the form of a black oily scum on the lake situated a little north of the Elms." Professor F. Oliver, F.L.S.,

in his paper on "The Effects of Urban Fog upon Cultivated Plants" (*Journ. R.H.S.*, xvi. p. 1) showed the extremely poisonous nature of such vaporised products; there would thus seem to be ample cause of injurious influence upon the trees, apart from the want of freedom in root production.

*Double Cyclamen*.—Dr. Masters reported as follows upon the specimen sent to the last meeting from Messrs. Ker, of Liverpool: "In these flowers there were five sepals, five distinct petals, no stamens, but several rows of additional petals. The ovary was normal."

#### PLANTS FROM CAMBRIDGE BOTANIC GARDENS.

Mr. R. I. Lynch forwarded the following rare and interesting species, for which a unanimous Vote of Thanks was passed, and to the three first named were awarded Botanical Certificates :—

*Kleinia pendula*, with fleshy stems and scarlet heads of flowers, from Somaliland. The genus *Kleinia* is a Groundsel or Senecio with fleshy stems; *K. neriifolia*, the 'Barode,' being a native of the Canary Islands; most of the species are South African. *K. pendula* has a rod-like, fleshy stem the thickness of a pencil, from which a long pendulous peduncle arises at the apex. The leaves are reduced to minute prickles.

*Kalanchoe marmorata*, another fleshy plant. *Kalanchoe* belongs to the Crassulaceæ, is from tropical Africa, but has species in Asia and Brazil. It has tubular, greenish-white flowers, nearly 6 inches in length, and fleshy obovate leaves.

*Nematanthus longipes* (Gesneraceæ) has sub-fleshy lanceolate leaves, and long scarlet tubular flowers protruding from one side of the calyx. It belongs to Gesneraceæ. There are only three or four species, all natives of Brazil.

*Phylica ericoides* (Rhamnaceæ), called Bruyère du Cop, is a Heath-like plant, with terminal clusters of minute white flowers.

*Lindenbergia grandiflora* (Scrophularinæ), figured in the October number of the *Botanical Magazine*, is a species with yellow flowers, and nearly allied to *Mimulus*. There are eight species in E. Africa, Arabia, the East Indies, and the Malay Archipelago.

*Senecio vulgaris* × *S. squalidus*, a remarkable natural hybrid between these two British plants, the former being the Groundsel, and the latter naturalised on old walls at Oxford and elsewhere. The flowers are small (half an inch from tips of ray florets), with the foliage of Groundsel. It comes perfectly true from seed, and has commenced being a weed in Cambridge Botanic Gardens. It is said to grow wild with its parents near Cork.

*Cardamine chenopodifolia* is remarkable for bearing perfect seed, both above and below ground. Mr. Lynch observes that he has two sets of plants—one always raised from seeds out of the subterranean pods, and another set always raised from the other seeds, in order to see whether in course of time any modification of habit may arise in consequence of growing always from seed produced in the same way. The white flowers are excessively minute, and are fertilised in bud, the anthers being closely adpressed to the globular stigma, the conditions usually prevailing with

normally self-fertilising Crucifers. The subterranean pods are white and spindle-shaped, and a quarter of an inch in length. They contain one or two seeds, separated by a delicate white membranous false dissepiment. They are attached to slender pedicels, 1 inch long, which turn abruptly downwards from their point of insertion in the stem. These are doubtless the result of cleistogamous buds.

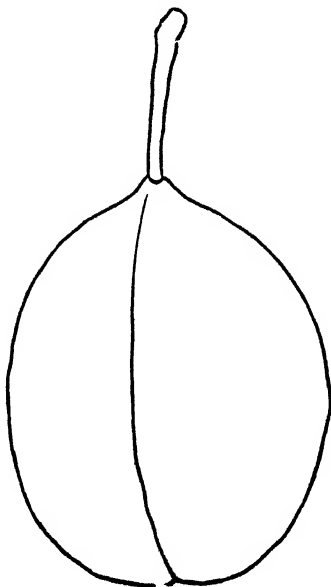
*Heliamphora nutans*.—The flower consists of five or four sepals, no petals, many stamens, the pistil having a long style and truncated apex, not spreading into an umbrella-like expansion as in the allied genus *Sarracenia*. There is but one species, a native of Guiana.

*Begonia venosa*.—This is remarkable on account of its fleshy leaves and large scarious stipules, both features being characteristic of hot and dry climates.

*Ceropegia dichotoma*, with tubular flowers, the tips only of the corolla remaining coherent. *C. stapeliaeformis* and *C. elegans* and *C. Woodi* are all remarkable fleshy climbers, the last bearing tubers and pendulous. It has been figured from the Cambridge plant in the *Botanical Magazine* of March 1900.

*Bonplandia geminiflora* (Polemoniaceæ) is remarkable for the corolla being two-lipped, the two upper petals cohering above the tube, and provided with a white-lined base as a "guide"; the three other petals, upon which the subdeclinate stamens rest, project forward. The long style, with three spreading stigmas, project a quarter of an inch beyond the anthers. It is a monotypic genus, of one species only, and a native of Mexico.

*Nepenthes Viellardi*, a species of Pitcher Plant, with small pitchers, 8 inches long, and remarkable for the white border round the incurved red margin. The lid is red, and the under side of the leaves russet but smooth.



**FRUIT AND VEGETABLE COMMITTEE.**

OCTOBER 9, 1900.

GEO. BUNYARD, Esq., V.M.H., in the Chair, and sixteen members present.

**Awards Recommended :—***Gold Medal.*

To the Rt. Hon. Lord Wantage, V.C., Lockinge Park (gr. Mr. W. Fyfe), for a splendid collection of Fruit.

*Silver-gilt Knightian Medal.*

To Messrs. Cannell, Swanley, for a collection of Vegetables and Gourds.

To John Warren, Esq., Handcross Park, Crawley (gr. Mr. A. Offer), for 100 dishes of Apples and Pears.

To C. Bayer, Esq., Tewkesbury Lodge, Forest Hill (gr. Mr. W. Taylor), for a collection of Fruit.

*Silver Knightian Medal.*

To Sir Marcus Samuel, The Mote, Maidstone (gr. Mr. W. H. Bacon), for 50 dishes of Pears.

To W. E. S. E. Drax, Esq., Olanteigh Towers, Kent (gr. Mr. J. Bond), for a collection of Vegetables.

To Messrs. Cannell, Swanley, for 100 dishes of Apples.

*Silver Banksian Medal.*

To Mr. J. Watkins, Pomona Farm, Withington, Hereford, for a collection of Crab Apples.

*First-class Certificate.*

To Plum 'President' (votes, unanimous), from Messrs. Rivers, Sawbridgeworth. Fruit very large, oval, almost black. The flesh has a distinct bullace flavour, and parts readily from the stone. The tree is of upright growth and a great bearer. It should prove a valuable market variety, as it is not so easily injured by spring frosts as some others, and comes into use when the majority of Plums are over.

*Award of Merit.*

To Melon 'Freechase Favourite' (votes, unanimous), from Sir Geo. Allen, Bart., Haywards Heath (gr. Mr. W. Mead). Raised from 'Hero of Lockinge,' and of the same colour, but the fruit is deeper and differently netted, with a very small cavity in the centre, and of fine flavour.

To Apple 'Rival' (votes, 9 for, 6 against), from Capt. Carstairs, Welford Park, Newbury (gr. Mr. C. Ross). Fruit above medium size, round; eye open, with reflexed segments, in a rather shallow basin: stalk  $\frac{1}{2}$  inch long and deeply inserted; skin yellow on the shaded side, nearly covered with red on the exposed side; flesh firm, juicy, and of good

flavour. It was said that the tree is of vigorous upright growth, and a profuse bearer. Raised from 'Peasgood Nonsuch' × 'Cox's Orange Pippin.' (Fig. 185.)

#### *Cultural Commendation.*

To Mr. J. Hudson, V.M.H., gr. to Leopold de Rothschild, Esq., Gunnersbury House, Acton, for Fig trees in fruit.

#### **Other Exhibits.**

Mr. John Ward, Shobdon, Herefordshire, sent an unnamed seedling Apple of good appearance but indifferent flavour.

Messrs. R. Veitch, Exeter, sent Apple 'Royal Snow' (*syn.* 'Pomme de Neige'), a very pretty fruit with exceedingly white flesh. They also sent Tomato 'Veitch's Glory,' grown in the open air.

Mr. A. W. Chapelow, King's College Gardens, Cambridge, sent Apples

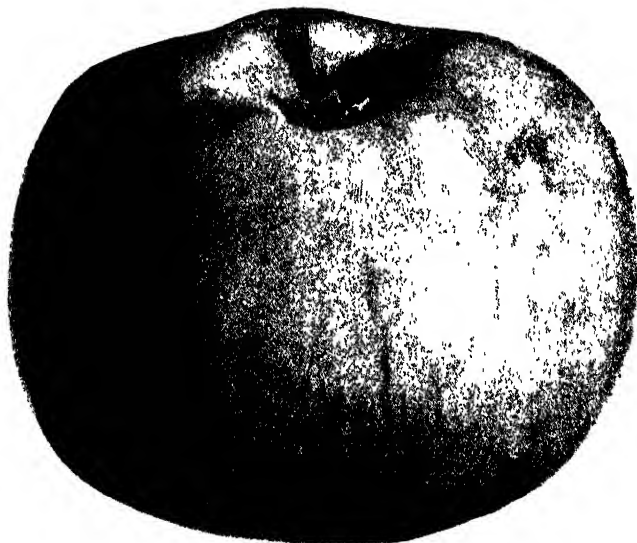


FIG. 185. 'APPLE 'RIVAL.' (*Journal of Horticulture.*)

raised from 'Peasgood Nonsuch' × 'Blenheim Orange,' which closely resembled the first named in appearance.

Capt. Carstairs, Welford Park, sent Apple 'The Houblon,' a pretty fruit which the Committee desired to see again later.

Mr. H. Glover, Orrell Lodge, Wigan, sent Apple 'Glover's Surprise,' raised from pips of the American 'Baldwin.' The fruit was of medium size and very sour.

Sir W. D. Pearson, Bart., M.P., sent fruiting branches of *Pyrus japonica*.

Capt. Farwell, The Priory, Burnham (Mr. W. Hutt), sent Apple 'Farwell's Seedling.'

Messrs. Cannell staged Apple 'Shoreham Beauty,' a long dark-red variety; and Apple 'Lord Roberts,' resembling 'Washington.'

Messrs. J. Veitch, Chelsea, sent Pea 'Autocrat,' in fine condition for

so late in the season. Also Tomato 'Chiswick Peach,' Apple 'Surprise' (*syn.* 'Landsberger Reinette'), and Peach 'Late Devonian.'

Messrs. Spooner, Hounslow, sent Apple 'The Baron,' a pretty striped fruit raised from 'Domelow's Seedling.' The Committee requested it to be shown again later.

Dr. Bonavia, Westwood, Richmond Road, Worthing, sent a basket of the 'Cape Gooseberry'—*Physalis peruviana*—the berries of which proved exceedingly palatable.

#### FRUIT AND VEGETABLE COMMITTEE, OCTOBER 23, 1900.

GEORGE BUNYARD, Esq., V.M.H., in the Chair, and twenty members present.

#### Awards Recommended :—

*Silver-gilt Knightian Medal.*

To Messrs. G. Bunyard, Maidstone, for 75 dishes of Pears.

*Silver Knightian Medal.*

To Messrs. Harrison, Leicester, for a collection of Onions.

*First-class Certificate.*

To Pear 'Glastonbury' (votes, 14 for, 2 against), from C. C. Tudway, Esq., The Cedars, Wells, Somerset (gr. Mr. J. F. Fewtrill). Fruit rather large, somewhat resembling a fine 'Beurré Hardy' in appearance; eye partly open, with erect segments, set in a very slight depression; stalk one inch long, inserted in a small shallow cavity; flesh white, melting, and of delicious flavour. This variety is not much known, but is worthy of a place in every garden. The tree is, *on the Pear stock*, said to be of vigorous habit and of upright growth, and a free bearer; but on Quince stock it is as yet a doubtful grower. The twelve fruits exhibited weighed  $6\frac{1}{2}$  lb., the largest one weighing 10 oz. (Fig. 186). For a note on the history and origin of this Pear see page 367.

*Award of Merit.*

To Melon 'Royalty' (votes, unanimous), from Lord Windsor, St. Fagan's Castle, Cardiff (gr. Mr. H. Pettigrew). Raised from 'Golden Orange' × 'Holborn Favourite.' Fruit large and of a beautiful golden colour, handsomely netted; flesh white, deep, melting, and exquisite flavour.

*Cultural Commendation.*

To W. Roupell, Esq., Harvey Lodge, Roupell Park, S.W., for two fine baskets of Apples, 'Cox's Orange Pippin' and 'Newton Wonder,' the former the king of dessert Apples, the latter probably one of if not the finest late cooking Apple we have.

To Mr. J. Matthews, gr. to Mrs. Maltby, Botley, Hants, for a box of splendid 'Beurré Diel' Pears, grown on a rejuvenated tree. See page 362.

To Mr. T. R. Cuckney, Cobham Hall Gardens, Gravesend, for a box of fine 'Coe's Golden Drop' Plums.

### Other Exhibits.

Howard Chapman, Esq., Darenth, Dartford, sent a seedling Apple, 'Andrew's Seedling,' raised from pips of 'Winter Queening,' very similar to 'Tom Putt' in appearance.

W. H. Long, Esq., Rood Ashton, Wilts (gr. Mr. W. Strugnell), sent fine fruits of Apple 'Rambour Franc.'

R. Mortimer, Esq., 1 Paper Buildings, Temple, sent an Apple unnamed.



FIG. 186.—PEAR 'GLASTONBURY.' (*Journal of Horticulture*.)

Messrs. Cross, Wisbech, sent a local seedling Pear without name. The fruit is of medium size, firm, and of nice colour, and should prove a good November market variety.

Messrs. Cheal, Crawley, sent a small collection of new and little-known Apples, also Apples 'Cowan's Victoria' and 'Nanny.' The latter is a pretty variety, but a long time in getting into a bearing state.

From the R.H.S. Gardens, Chiswick, came a collection of Gourds from

seeds sent by Dr. Bonavia, Worthing; Mr. J. B. Orman, Lewis, Iowa, U.S.A.; and Messrs. J. S. Pearce, 119 Dundas Street, London, Ontario.

Lord Walsingham, Merton Hall, Thetford, sent Melon 'Thirkleby Park,' a green-fleshed variety, with a green skin heavily netted. The Committee desired to see it again next year earlier in the season. Lord Walsingham wrote that this "Melon is described in the 'Transactions of the Horticultural Society,' 1822, Vol. IV., page 514, and sent in the autumn of 1820, under the name of 'Green-fleshed Egyptian,' by Sir Thomas Frankland, Thirkleby Park, Yorkshire, the seed being originally received from the Archbishop of York in 1808, and has been grown at Merton Hall ever since under the name of 'Thirkleby Park Melon.' Sir Thomas Frankland was great-grandfather of the present Lord Walsingham." It was noticed that whereas the specimen sent was of a decidedly green skin and heavily netted, it is described in Vol. IV., 1822, as "the skin is pale, almost white, very thin, smooth, with few reticulations." This illustrates the extreme difficulty of keeping a Melon quite true to character through a long series of years; variation seems ingrained and inevitable under cultivation.

Mr. W. A. Cook, gr. to Major Heneage, Compton Basset, Wilts, sent a dish of Carter's 'Michaelmas' Pea.

Mr. T. Mugleston, Brasted, Kent, sent an unnamed Apple.

Mr. T. Elsworth, Corn Market, Warwick, sent a seedling Apple from Lord Suffield.

Mr. J. Watkins, Pomona Farm, Hereford, sent Plum 'Coe's Violet.' This variety differs from 'Coe's Golden Drop' in being more bronzy in colour, and having a stripe of violet down the suture.

Rev. W. Wilks, M.A., Shirley Vicarage, Croydon, sent a well-grown plant of Shantung Cabbage, *Brassica sinensis*. The plant has long succulent foliage like a Cos Lettuce, forming no heart, and quickly running to seed in the early summer. The flavour is rather like Spinach, good and delicate, and, further, it is agreeable to the eye when cooked, which is not always the case with Cabbage. The young leaves are also recommended for mixing with salads. It is of no use whatever as a summer Cabbage, but will be found excellent for late autumn and early winter use—November and December.

#### FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 6, 1900.

JOSEPH CHEAL, Esq., in the Chair, and eighteen members present.

#### Awards Recommended:—

##### *Silver-gilt Knightian Medal.*

To the Duke of Rutland, Belvoir Castle, Grantham (gr. Mr. W. H. Divers), for 80 dishes of Apples and Pears.

To Mr. E. Neal, The Gardens, Tilgate, Crawley, for 80 dishes of Apples and Pears, and two stands of Grapes.

##### *Silver Banksian Medal.*

To Messrs. Peed, Roupell Park Nurseries, West Norwood, for 80 dishes of Apples and Pears.

*First-class Certificate.*

To Pear 'Doyenné du Comice' (votes, 8 for, 4 against), from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain). This delicious Pear is now fairly well known and of the highest merit. Pear growers have long regarded it as being, in its season, the prince of all Pears. In the South and West of England, at least, it does very well as a bush, but it is everywhere worthy of wall space. The great advantage of growing it in both ways is that the fruits from the bush trees ripen after those from the wall are over, and so a longer continued supply can be maintained.

*Award of Merit.*

To Melon 'Late Perfection' (votes, 10 for, 7 against), from the Marquis of Bute, Cardiff Castle, Cardiff (gr. Mr. A. Pettigrew). Fruit large, oval, a dull yellowish-bronze colour, beautifully netted all over; flesh firm but melting, green, and of fine flavour, particularly for so late in the season. Mr. Pettigrew wrote that the plant is a robust grower, free bearer, and that the fruit will keep in good condition for a month after it is ripe.

To Parsley 'Dobbie's Selected' (votes, 5 for), from Messrs. Dobbie, Rothesay. The plants were exhibited in pots, from seed sown in April last; the foliage is of moderate and useful size, and most beautifully curled.

*Cultural Commendation.*

To Mr. J. Crook (gr. to Miss Evans, Forde Abbey, Chard), for excellent dishes of 'Ickworth Impératrice' and 'Coe's Golden Drop' Plums; also 'Winter Nélis' and 'Josephine de Malines' Pears.

To Messrs. Lane, Berkhamstead, for a basket of large and highly coloured fruits of Apple 'Lane's Prince Albert.'

To Mr. Will Taylor, Osborn Nursery, Hampton, for large and well-ripened bunches of Grapes 'Reine Olga,' grown in the open air. See Vol. XXIII., page clxxii.

**Other Exhibits.**

The Marquis of Huntly, Orton Hall, Peterborough (gr. Mr. A. Harding), sent a dish of richly coloured fruits of 'Forelle,' or 'The Trout Pear.'

Dr. Bonavia, Westwood, Richmond Road, Worthing, staged four varieties of wine Grapes, viz., 'Ligman' and 'Sullivan,' white varieties; and 'Portugais bleu' and 'Linnie,' black varieties.

Messrs. Horne, Perry Hill, Rochester, sent a dish of Apple 'Charles Ross.'

Captain Carstairs, Welford Park, Newbury (gr. Mr. C. Ross), sent Apples 'Berks Pearmain,' 'C.I.V.,' and 'The Beacon,' and Pear 'The Popham.'

L. Messel, Esq., Nymans, Crawley (gr. Mr. J. Comber), sent a medium-sized dark purple Plum, which is probably a local seedling.

Mr. W. Palmer, Andover, staged fruits of Apple 'Lord Kitchener,' a seedling from Dunselow's Seedling, and too like its parent to be

considered sufficiently distinct. He also exhibited beautiful fruits of Apple 'Stubbs' Seedling' under the name of 'Late Quarrenden.'

Mr. A. Taylor, Rowan Villa, Ash Vale, Surrey, sent Apple 'Winnie Taylor's Seedling,' a rather pretty green fruit of fair quality.

S. A. Kirk, Esq., The Laurels, Southam, Rugby, sent fruits of Apple 'Kirk's Seedling.'

Messrs. W. & J. Brown, Peterborough, sent 8 dishes of Apples 'Beeton's Glory,' 'Becton's Seedling,' and 'Pinder's Seedling.' The two first named were promising varieties, and the Committee desired to see them again with particulars as to growth, &c.

Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain), sent 'Chou de Milan de Belleville' Savoy, and 'Chou de Brunswick' Cabbage. The latter very similar to 'Christmas Drumhead.'

The Duke of Northumberland, Albury Park, Guildford (gr. Mr. W. C. Leach), sent Cabbage 'Union Jack.'

Mr. Lush, The Gardens, King's Hill, Berkhamstead, sent Apple 'King's Hill Seedling,' very similar to Dumelow's Seedling, but softer in the flesh.

Mr. A. J. Thomas, Sittingbourne, sent Apple 'Diamond Jubilee.' The Committee wished to see it again later in the season.

Mr. Marcham, The Glade, Englefield Green, sent very good fruits of 'Salway' Peach grown against an open wall, the tree bearing twelve dozen fruits.

### THE SHERWOOD SILVER CUP COMPETITION, 1900.

For 54 dishes of Fruit (6 Fruits to a dish) grown by the exhibitor in the open air, namely:—

18 varieties of Cooking Apples	18 varieties of Dessert Pears
12 „ Dessert „	6 „ Cooking „

First Prize.—Roger Leigh, Esq., Barham Court, Maidstone (gr. Mr. G. Woodward), Sherwood Silver Cup, value £10. 10s.

Second Prize.—Mr. A. J. Thomas, Rodmersham, Sittingbourne, Hogg Medal and £3.

Third Prize.—Sir Marcus Samuel, Mote Park, Maidstone (gr. Mr. W. H. Bacon), and A. H. Smee, Esq., The Grange, Hackbridge, Carshalton (gr. Mr. W. E. Humphreys), equal third, Silver Knightian Medal and £2.

### FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 20, 1900.

GEO. BUNYARD, Esq., V.M.H., in the Chair, and fourteen members present.

### Awards Recommended:—

#### *Silver Banksian Medal.*

To Messrs. Harrison, Leicester, for a collection of Vegetables.

#### *First-class Certificate.*

To Pear 'Beurré Dubuisson' (votes, 12 for, 1 against), from the Duke of Rutland, Belvoir Castle, Grantham (gr. Mr. W. H. Divers). Fruit

rather large, obovoid ; skin yellow, covered with minute brown dots, and slightly flushed with red on the exposed side ; eye nearly closed, with erect segments, and set in a very small shallow depression ; stalk thick,  $\frac{3}{4}$  inch long, and inserted rather obliquely. Flesh white, melting, and of good flavour. Mr. Divers wrote : "It is one of the very best Pears for early winter use, as it comes in just after 'Doyenné du Comice' is over,

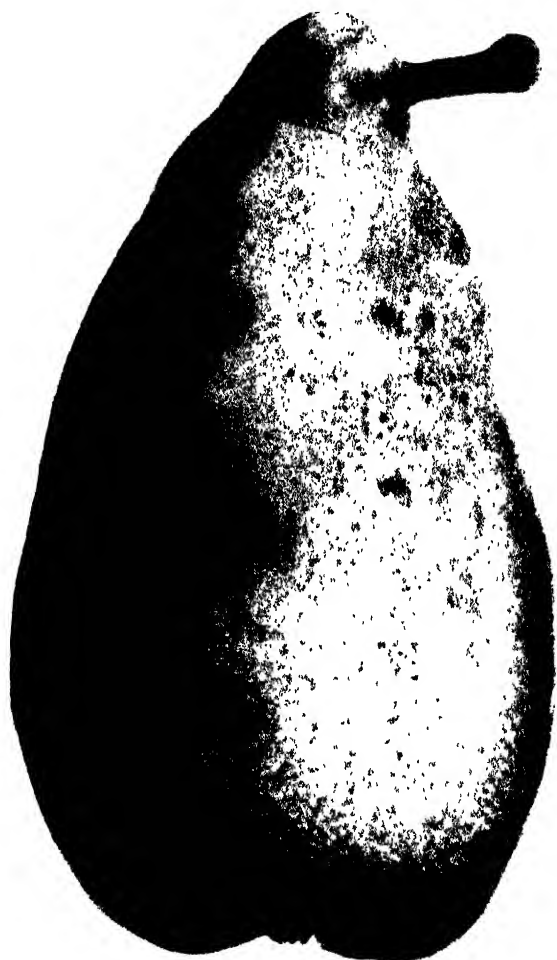


FIG. 187.—PEAR 'BETTERI. DUBUISSON.' (*Journal of Horticulture*.)

and keeps well for several weeks after it gets ripe. It bears well here on the Pear stock, both as a pyramid and trained against an east wall." (Fig. 187.)

*Award of Merit.*

To Cabbage 'Dobbie's Selected Winningstadt' (votes, unanimous), from Messrs. Dobbie, Rothesay. A very fine selection of this excellent variety, all the heads being of moderate size, very firm, with pointed conical form, with a small spread of outer foliage.

*Cultural Commendation.*

To Mr. M. Mills, gr. to Frank Lloyd, Esq., Coombe House, Croydon,

for a remarkably fine dish of stewing Pear 'Double de Guerre.' The Rev. W. Wilks stated that the trees of this first-class stewing Pear produced splendid crops annually at Coombe House.

### Other Exhibits.

Mr. F. Steadman, Coddington Hall Gardens, Newark-on-Trent, sent a seedling Onion from 'Cranston's Excelsior' × 'Veitch's Maincrop.'

E. W. Caddick, Esq., Caradoc, Ross (gr. Mr. M. Roe), sent a highly coloured Apple named 'Caradoc Scarlet.' The Committee desired to see it again in February.

Miss Roberts, Rose Hill House, Ipswich, sent Pear 'The Kieffer' (*syn.* 'Kieffer Seedling'). Fruit over the medium size, obovate, and the colour of 'Buerré Diel.' The flesh is very distinct in flavour, and has somewhat the taste of a Quince, and though a great favourite in America is only second-rate in this country.

Mr. Will Taylor, Hampton, sent large bunches of Grape 'Reine Olga.'

Miss J. Ede, The Rest, Avenue Road, Bexley Heath, sent Apple 'Bexley Heath Pippin,' raised from pips of 'Ribston Pippin,' but decidedly inferior to the parent fruit.

Miss Breton, Forest End, Sandhurst (gr. Mr. R. Handley), sent magnificently grown Cardoons.

Sir W. D. Pearson, Bart., M.P., sent a large cluster of the fruit of *Musa Cavendishii*—Bananas, grown at Paddockhurst, Sussex (Fig. 190).

Mr. Kneller, The Gardens, Malshanger, Basingstoke, sent Apple 'Malshanger Russet.'

### FRUIT AND VEGETABLE COMMITTEE, DECEMBER 4, 1900.

(GEO. BUNYARD, Esq., V.M.H., in the Chair, and twenty-four members present.

### Awards Recommended:—

#### *First-class Certificate.*

To Pear 'Nouvelle Fulvie' (votes, 16 for), from Roger Leigh, Esq., Barham Court, Maidstone (gr. Mr. G. Woodward). Fruit rather above medium size, pyriform, and very uneven in outline; skin yellow and covered with small russet dots; eye half open, with rather large flat segments; stalk 1 in. long, fleshy at the base, and occasionally obliquely inserted; flesh soft, melting, and of most delicious flavour. The tree is a good bearer on both the Quince and the Pear stocks, and though a comparatively old variety is not sufficiently known. (Fig. 188.)

#### *Award of Merit.*

To Pear 'Charles Ernest' (votes, unanimous), from Messrs. Veitch, Chelsea. Fruit large and varying in shape, some being much longer than others; skin yellow, slightly flushed with red on the exposed side; eye closed, with small erect segments, set in a shallow basin; stalk

$\frac{3}{4}$  inch long, rather obliquely inserted, and surrounded with russet; flesh white, melting, and of good flavour. (Fig. 189.)

*Cultural Commendation.*

To Mr. W. Crump, V.M.H., gr. to Earl Beauchamp, Madresfield Court, Malvern, for magnificent bunches of 'Black Morocco' Grapes.

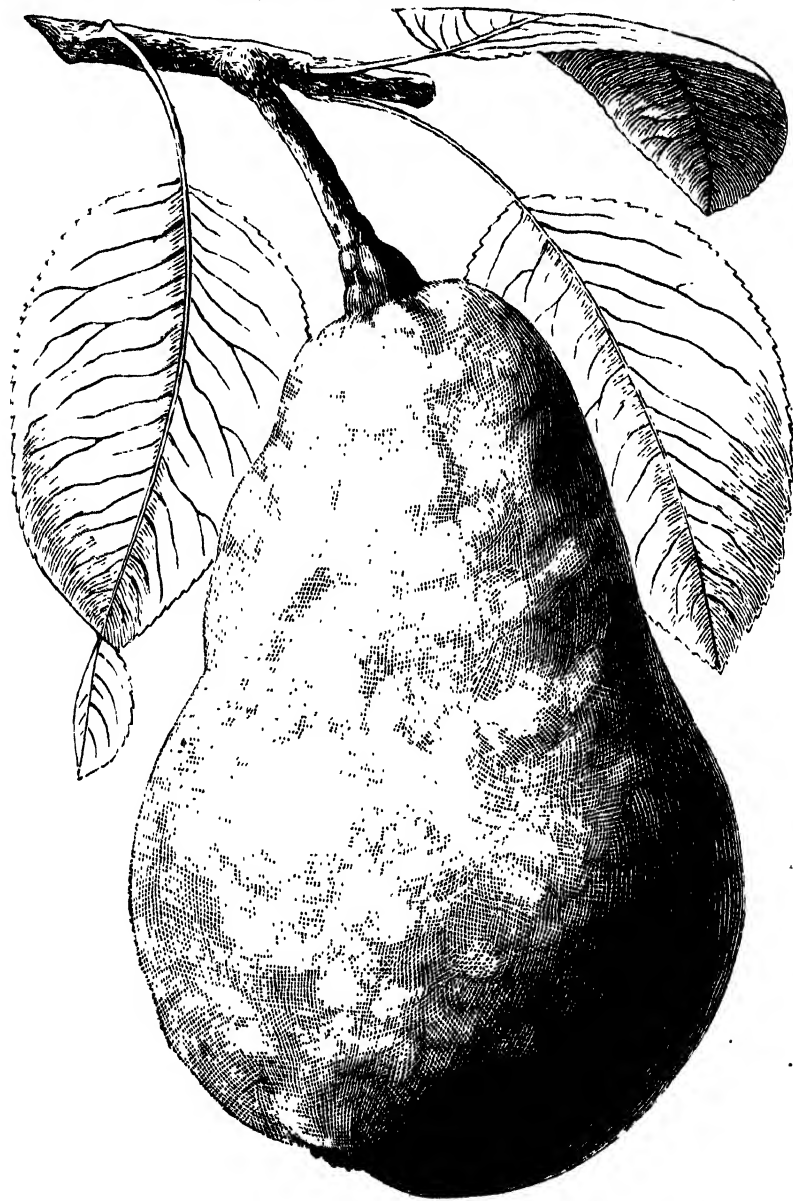


FIG. 188. --PEAR 'NOUVELLE FULVIE.' (*Journal of Horticulture.*)

**Other Exhibits.**

Mr. J. Watkins, Pomona Farm, Withington, Hereford, sent Apple 'British Queen,' raised from 'Blenheim Orange'  $\times$  'King of the Pippins.' The fruits were large and very handsome, showing the character of both

parents, but were a little past their best. He also sent an ornamental American Crab, 'Quaker Beauty,' the flavour being between that of the Apple and the Crab.'

Messrs. Dobbie, Rothesay, staged 2 boxes of Leeks and 16 dishes of hybrid Turnips, some of which were of promising appearance.

Messrs. Cannell, Swanley, sent enormous roots of Parsnip 'Cannell's Prizewinner.'

Mrs. Hudson, Gunnersbury House, Acton, sent a jar of jelly made



FIG. 189.—PEAR 'CHARLES ERNEST.' (*Journal of Horticulture*.)

from unpeeled fruits of *Pyrus* (*Cydonia*) *japonica*, which was very palatable. Mrs. Hudson considers that the flavour of the fruit is to a great extent lost if it be peeled before cooking.

Mr. Henry Crawley, The Grange Gardens, Sevenoaks, sent a seedling Grape from 'Black Prince' ♂ and 'Black Alicante' ♀, similar in appearance to the latter, but with the poor flavour of the former.

Rev. W. Wilks, M.A., Shirley Vicarage, Croydon, sent stewed fruit of the 'Old Bullace.' The fruit had only been gathered the previous day

and was of excellent flavour, showing how the season of fresh fruit may be prolonged by the use of this very hardy and prolific Bullace.

Mr. A. Dean proposed the following Resolution, viz. :—

“ This Committee learns with profound regret of the resignation by Mr. Philip Crowley of the office of Chairman, which he has so long and so admirably filled, and hereby records its sense of the great loss sustained by such resignation. The Committee further desires to tender to him in his illness its sincere sympathy, and to express the earnest hope that under medical skill he may yet be restored to health, and once more occupy his former position at this table.”

Mr. H. Balderson seconded the Resolution, and, on its being put to the Committee by the Chairman, it was carried unanimously.

[Mr. Philip Crowley died on December 20. His portrait will be found on page 158.]

#### FRUIT AND VEGETABLE COMMITTEE AT CHISWICK, DECEMBER 11, 1900.

W. BATES, Esq., in the Chair, and seven members present.

The Committee examined 15 stocks of Celery and 5 stocks of Celeriac. They also had eight stocks of Potatos cooked, viz. . . .

Beehive	Sir John Llewelyn
Duchess of Buccleuch	Superb
Dumfries Model	Tommy Atkins
Kate Henderson	Twentieth Century.

#### Awards Recommended :—

##### *Highly Commended.*

Celery ‘Champion Solid White’ (votes, unanimous), from Messrs. Barr, Covent Garden, W.C.

Celery ‘Ivery’s Pink’ (votes, unanimous), from Messrs. J. Veitch, Chelsea.

Celery ‘Early Rose’ (votes, unanimous), from Messrs. J. Veitch.

Celery ‘Standard Bearer Red’ (votes, unanimous), from Messrs. Watkins & Simpson, 13 Exeter Street, Strand, W.C.

Celery ‘Bibby’s Defiance White’ (votes, unanimous), from Messrs. Watkins & Simpson.

Celery ‘Covent Garden Red’ (votes, unanimous), from Messrs. Watkins & Simpson.

Potato ‘Dumfries Model’ (votes, unanimous), from Mr. W. Kerr, Dumfries.

#### FRUIT AND VEGETABLE COMMITTEE, DECEMBER 18, 1900.

G. BUNYARD, Esq., V.M.H., in the Chair, and thirteen members present.

#### Awards Recommended :—

##### *Silver Banksian Medal.*

To Messrs. Lee, 19 Knightrider Street, Maidstone, for a Fruit Bottling Apparatus, and samples of bottled fruit. (See figs. 172, 178, page 364.)

To Messrs. Carter, High Holborn, for a group of Capsicums.  
To Sir W. D. Pearson, Bart., M.P., Paddockhurst, Crawley (gr. Mr.



FIG. 190.—SIR W. D. PEARSON'S BANANAS. (*Gardeners' Chronicle*.)

A. B. Wadds), for excellent fruit of *Musa Cavendishii*—Bananas, grown in his garden. (Fig. 190).

*Award of Merit.*

To Pear 'Olivier de Serres' (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain). Fruit rather

small, nearly round, uneven in outline; eye large and closed, set in a deep basin; stalk nearly one inch long, thick at the base, not set in a cavity; skin covered with a deep russet; flesh melting, very juicy, and of delicious vinous flavour. This variety deserves a wall because of its high quality, and, except in very favourable localities, it is an uncertain bearer as a bush in the open ground.

To Celery 'Champion Solid White' (votes, unanimous), from Messrs. Barr, 12 King Street, Covent Garden.

To Celery 'Ivery's Pink' (votes, unanimous), from Messrs. J. Veitch, Chelsea.

To Celery 'Early Rose' (votes, unanimous), from Messrs. J. Veitch.

To Celery 'Standard Bearer' (votes, unanimous), from Messrs. Watkins & Simpson, 13 Exeter Street, Strand.

To Celery 'Covent Garden Red' (votes, unanimous), from Messrs. Watkins & Simpson.

To Celery 'Bibby's Defiance' (votes, unanimous), from Messrs. Watkins & Simpson.

To Potato 'Dumfries Model' (votes, unanimous), from Mr. W. Kerr, Dumfries.

The above varieties of Celery and the Potato had been Highly Commended at Chiswick on December 11.

#### *Cultural Commendation.*

To Mr. G. Dixon, gr. to the Earl of Ilchester, Holland House, Kensington, for very fine fruits of Pear 'Glou Morceau,' grown on a standard tree at Holland House 60 years old.

To Mr. W. Allan, gr. to Lord Suffield, Gunton Park, Norwich, for exceptionally large and good fruits of Pear 'President Barabe.'

To Mr. J. Douglas, Edenside, Great Bookham, for large highly coloured fruits of Apple 'Allington Pippin.'

#### **Other Exhibits.**

Capt. Carstairs, Welford Park, Newbury (gr. Mr. C. Ross), sent three varieties of Apples, viz., 'Mottled Russet,' 'Rival,' 'The Houblon,' and Pear 'Ace'—fruit small, Bergamotte-shaped; eye open, with reflexed segments; stalk  $\frac{3}{4}$  inch long, set in a shallow cavity; skin yellow, spotted with russet; flesh soft, melting, and of good flavour.

Messrs. J. Veitch staged a small collection of Carrots.

Messrs. Spooner, Hounslow, sent Apple 'The Baron.'

Mr. W. W. Cox, Collingwood, Ontario, Canada, sent per Messrs. Lane, Berkhamstead, a collection of Canadian Apples. 'Baldwin' proved to be the best-flavoured variety, followed by 'King of Tompkins County.'

Lord Aldenham, Aldenham House, Elstree (gr. Mr. E. Beckett), sent jelly made from fruit of *Pyrus japonica carnea*, of excellent flavour; also jelly made from fruit of *Rosa rugosa*, which proved to be very good and pleasant, resembling a combination of the flavour of the Guava and the Quince.

**FLORAL COMMITTEE.**

AT CHISWICK, OCTOBER 5, 1900.

W. MARSHALL, Esq., in the Chair, and eight members present.

**Awards Recommended :—***Highly commended.*

To Cactus Dahlias :—1 'Brema,' 2 'Stella,' 3 'Starfish,' 4 'Cycle,'  
5 'Keyne's White,' 6 'Island Queen,' 7 'J. E. Frewer,' 8 'Henry Ayres,'  
9 'Oaklands,' 10 'Tillie,' 11 'Charles Woodbridge.' (See page 390.)

To Decorative Cactus Dahlia 'Orange Glare of the Garden.'

FLORAL COMMITTEE, OCTOBER 9, 1900.

W. MARSHALL, Esq., in the Chair, and fourteen members present.

**Awards Recommended :—***Silver-gilt Flora Medal.*

To Captain Holford, C.I.E., Westonbirt, Tetbury, Gloucester (gr. Mr. A. Chapman), for a magnificent display of autumn-tinted trees and shrubs.

*Silver-gilt Banksian Medal.*

To Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.), for Salvias and scented-leaved Pelargoniums.

To Messrs. Barr, Covent Garden, for hardy flowers.

*Silver Flora Medal.*

To Messrs. Jas. Veitch, Chelsea, for perennial Asters (Michaelmas Daisies), showing what charming plants they are for autumn decoration when grown outdoors in pots. (Fig. 191.)

*Silver Banksian Medal.*

To Mr. W. Taylor, Hampton, for Roses.

To Mr. H. B. May, Upper Edmonton, for Bouvardias.

To Messrs. Ware, Feltham, for Dahlias and hardy flowers.

To Messrs. Hill, Lower Edmonton, for *Ficus radicans variegata* and Ferns.

To Messrs. Wells, Redhill, for Chrysanthemums.

To Mr. John Russell, Richmond, for a collection of hardy *Ligustrums* (Privets).

*Bronze Flora Medal.*

To Messrs. W. Paul, Waltham Cross, for hybrid seedling Roses raised between Tea scented and China varieties.

*Award of Merit.*

To *Polygonum* (*Persicaria*) *orientale* (votes, 10 for, 1 against), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.). A free-growing hardy annual, with broad deep-green leaves and small red flowers, borne in terminal and axillary racemes with great freedom. It was introduced from the East Indies in the early part of the seventeenth century, and grows usually about 4 feet high.

To *Dracæna* *Offeri* (votes, 9 for), from John Warren, Esq., Handcross Park, Crawley (gr. Mr. A. Offer). This is the result of crossing *D. Gladstoni* with *D. Warreni*. The plant is of graceful habit, with long, narrow, arching bronze-green leaves, distinctly margined with crimson and carmine.

To Perennial Aster 'Hon. Edith Gibbs' (votes, unanimous), from Lord Aldenham, Aldenham House, Elstree (gr. Mr. E. Beckett). A seedling from *A. ericoides elegans*, of graceful habit, with small lavender flowers borne in great profusion. It grows 5½ feet high.

To Perennial Aster 'Captivation' (votes, 9 for, 1 against), from Lord Aldenham (gr. Mr. E. Beckett). This is a seedling from 'Pleiad,' and grows 3½ feet high. It is very floriferous, and the flowers are a pretty shade of blush-lilac or pink.

To Perennial Aster 'Hon. Vicary Gibbs' (votes, 10 for, 3 against), from Lord Aldenham (gr. Mr. E. Beckett). Also a seedling from 'Pleiad.' It grows 3 feet high and bears medium-sized rosy-mauve flowers freely.

To *Kniphofia* 'Triumph' (votes, 10 for), from Messrs. Barr, Covent Garden. A very large substantial spike with rich yellow flowers and prominent anthers.

To *Kniphofia* *Leichtlini aurea* (votes, 12 for), from Messrs Barr, Covent Garden. A small sturdy spike with bright canary-yellow flowers and conspicuous orange-scarlet anthers.

To Tea Rose 'Morning Glow' (votes, 10 for), from Messrs. W. Paul, Waltham Cross. A remarkably pretty free-flowering Rose with salmon coloured blossoms touched with orange.

To *Chrysanthemum* 'Mrs. J. Williams' (votes, unanimous), from Mr. J. Williams, Lewisham. A lovely primrose-yellow sport from 'Lady Fitzwygram.' The habit is identical with that of its parent.

To *Cactus* *Dahlia* 'Mrs. H. Allcroft' (votes, 9 for, 2 against), from Mr. S. Mortimer, Farnham. Flowers large, with long narrow twisted orange-yellow petals flushed with salmon.

To *Nerine* 'Purple Prince' (votes, 9 for) from Mr. H. Elliott, Hurstpierpoint. This pretty seedling produces a short stout spike with medium-sized crimson flowers, slightly flushed with purple near the margins of the petals.

To *Cupressus* *Lawsoniana pygmæa argentea* (votes, unanimous), from Messrs. Backhouse, York. A very dwarf-growing form of the well-known *Lawson's Cypress* with cream-coloured foliage. It is a grand miniature conifer for the rock-garden.

**Other Exhibits.**

Lord Aldenham, Elstree (gr. Mr. E. Beckett), sent a large collection of seedling Asters (*Michaelmas Daisies*). (Fig. 191.)

Miss E. Armitage, Dadnor, Ross, sent a new hybrid Aster, and *Gypsophila* 'The Pearl.'

Mrs. E. P. Rogers, Burncoose, Perranwell, R.S.O., Cornwall, sent unnamed Fuchsias and Hydrangeas.

From Mr. H. Elliott, Hurstpierpoint, came seedling Nerines.

Messrs. Backhouse, York, sent the white and purple flowered forms of *Colchicum speciosum*, two of the most beautiful hardy introductions of late years. (Fig. 192.)

Mr. J. Williams, Lewisham, sent Chrysanthemums.

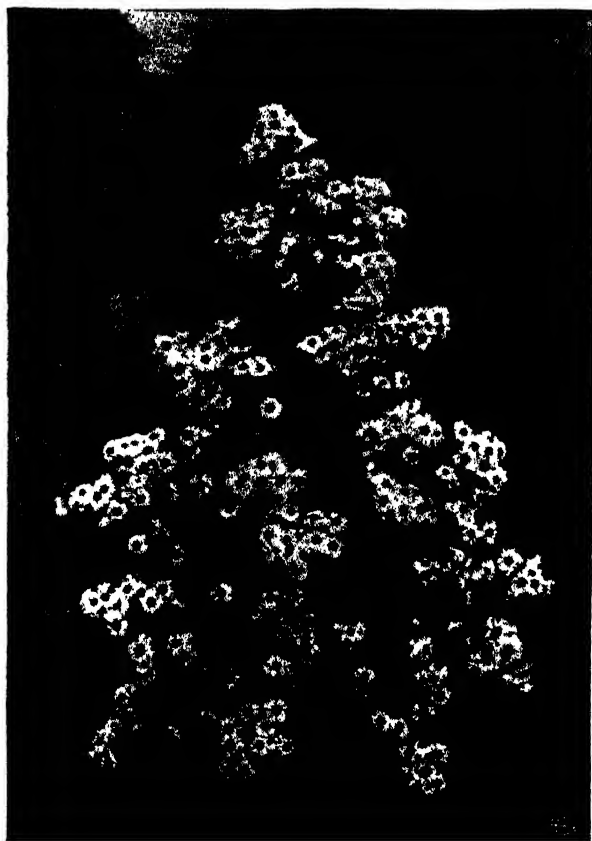


FIG. 191.—SEEDLING ASTER. (*The Garden*).

Messrs. Jackman, Woking, sent hardy flowers.

Messrs. Johnson, Boston, sent Sweet Peas.

From Messrs. Dobbie, Rothesay, came Dahlias and Chrysanthemums.

#### FLORAL COMMITTEE, OCTOBER 23, 1900.

W. MARSHALL, Esq., in the Chair, and nineteen members present.

*Silver-gilt Flora Medal.*

To Mr. Norman Davis, Framfield, Sussex, for an artistic arrangement of Chrysanthemums.

*Silver-gilt Banksian Medal.*

To Mr. T. Rochford, Broxbourne, Herts, for a remarkably fine display of retarded Lilies of the Valley.

To Messrs. Jas. Veitch, Chelsea, for Chrysanthemums.

To Mr. R. C. Pulling, Woodford Green, for foliage and flowering plants.



FIG. 192.—COLCHICUM SPECIOSUM. (*The Garden.*)

*Silver Flora Medal.*

To Messrs. Cannell, Swanley, for Cannas.

To Mr. H. B. May, Upper Edmonton, for Adiantum Farleyense and Begonia 'Gloire de Lorraine.'

To Mr. G. Prince, Oxford, for Roses.

To Mr. W. J. Godfrey, Exmouth, for Chrysanthemums.

To Mr. K. Drost, Richmond, for Chrysanthemums.

*Silver Banksian Medal.*

To Messrs. Wells, Redhill, for *Chrysanthemums*.

*Bronze Flora Medal.*

To Messrs. Cutbush, Highgate, for *Pernettyas*.

To Messrs. Barr, Covent Garden, for *Chrysanthemums* and hardy flowers.

*Award of Merit.*

To *Veronica* 'Diamant' (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. James Hudson, V.M.H.). A beautiful *Veronica*, much stronger in growth than V. 'La Séduisante.' Its leaves are lanceolate, rich glossy green, and the rosy-carmine flowers are borne in long spikes abundantly.

To Japanese *Chrysanthemum* 'Lily Mountford' (votes, unanimous), from Mr. M. Gleeson, Stanmore. An exceptionally large flowered variety, with broad substantial rosy-purple petals, passing to delicate rose and silvery-pink.

To Japanese *Chrysanthemum* 'Earl of Arran' (votes, 11 for, 4 against), from Viscountess Hambledon, Greenlands, Henley-on-Thames (gr. Mr. H. Perkins). Large flowers with long drooping canary-yellow petals with a paler reverse.

To Incurved Japanese *Chrysanthemum* 'Master E. Seymour' (votes, 12 for), from Viscountess Hambledon, Henley-on-Thames (gr. Mr. H. Perkins). Beautifully shaped large chestnut-red flowers, with a bronzy-yellow reverse.

To *Scolopendrium vulgare Stansfieldii* (votes, unanimous), from C. T. Druery, Esq., V.M.H., Shaa Road, Acton. A remarkably pretty and distinct form of the well-known Hart's Tongue Fern, with beautifully crested and frilled fronds.

To Incurved *Chrysanthemum* 'Matthew Russell' (votes, 12 for), from Mr. H. J. Jones, Lewisham. A superb variety with large bronzy-yellow flowers.

To Japanese *Chrysanthemum* 'Mrs. Emma Fox' (votes, unanimous), from Mr. W. Seward, Hanwell. Very large beautifully formed flowers, colour bright red with a gold reverse.

To Japanese *Chrysanthemum* 'Mr. S. Fryett' (votes, 11 for, 2 against), from Mr. W. Seward, Hanwell. Medium-sized flowers with drooping bright crimson-purple petals, with a silvery reverse.

To Japanese *Chrysanthemum* 'Mrs. F. Gray Smith' (votes, 9 for, 1 against), from Mr. W. J. Godfrey, Exmouth. Beautifully formed rich yellow flowers touched with orange.

To Japanese *Chrysanthemum* 'Mrs. Coombes' (votes, unanimous), from Mr. Godfrey, Exmouth. A distinct and pretty variety with long drooping pale rose florets.

To Japanese *Chrysanthemum* 'J. R. Upton' (votes, unanimous), from Mr. Godfrey, Exmouth. A large flower with loosely arranged canary-yellow petals with a paler reverse.

To Japanese *Chrysanthemum* 'Charles Longley' (votes, 18 for), from Messrs. Wells, Redhill. A very large and exceedingly handsome purple flower with a silvery reverse.

To H.T. Rose 'Lady Battersea' (votes, unanimous), from Messrs. Paul, Cheshunt. Lovely, sweet-scented carmine or rosy-red flowers borne on peculiarly long stems. The plant is of good habit, very floriferous, and useful for autumn and winter flowering. (Fig. 193.)

### Other Exhibits.

Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.), sent six varieties of New Zealand Veronicas.



FIG. 193.—HYBRID TEA ROSE 'LADY BATTERSEA.' (*The Garden*.)

H. J. Elwes, Esq., Colesborne, Andoversford, Gloucestershire (gr. Mr. T. Beesley), sent a small and interesting group of Nerines.

Lord Aldenham, Elstree (gr. Mr. F. Beckett), sent two varieties of Asters (Michaelmas Daisies).

From Messrs. Peed, West Norwood, came a group of Begonias.

Messrs. Jas. Veitch, Chelsea, sent hybrid Streptocarpus.

Mrs. G. W. Piper, Uckfield, sent Roses.





FIG. 194.—*BEGONIA* 'GLOIRE DE LORRAINE.' (*The Garden*.)

(*To face page 101.*)



Mons. Ernest Lacroix, Chalons-sur-Marne, sent samples of a support for flowers, plants, Strawberries, &c.

Messrs. G. Bunyard, Maidstone, sent a plant of *Cupressus Lawsoniana*, 'Triomphe de Boskoop,' a pleasing variety with glaucous foliage.

From Messrs. Barr, Long Ditton, came sprays of *Phalaris gigantea* variegata. The Committee asked to see a plant.

Chrysanthemums were exhibited by—

(1) C. Pritchard, Esq., Grove Park, Chiswick.

(2) Mrs. Scaramanga, Westhill, Shanklin, I.W. (gr. Mr. C. H. Snook).

(3) Mr. M. Silsbury, Shanklin, I.W.

(4) Mr. R. Holmes, Tuckswood Farm, Norwich.

(5) Mr. F. C. Fowle, Teignmouth.

(6) Messrs. Cannell, Swanley.

#### FLORAL COMMITTEE, NOVEMBER 6, 1900.

W. MARSHALL, Esq., in the Chair, and nineteen members present.

#### Awards Recommended :—

##### *Silver Flora Medal.*

To Miss Adamson, South Villa, Regent's Park (gr. Mr. G. Kelf), for *Celosias* and 40 varieties of *Chrysanthemums*.

To Messrs. Jas. Veitch, Chelsea, for winter-flowering *Begonias*.

To Messrs. Paul, Cheshunt, for *Roses*.

##### *Silver Banksian Medal.*

To Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.), for *Begonia* 'Mrs. Leopold de Rothschild,' and *Nymphæas*.

To Earl de Grey, Coombe Court, Kingston (gr. Mr. J. Smith), for *Begonia* 'Gloire de Lorraine' and *Spiræas*. (Fig. 194.)

To Purnell Purnell, Esq., Woodlands, Streatham Hill, for foliage and flowering plants.

To Messrs. Jas. Veitch, Chelsea, for *Chrysanthemums*.

To Messrs. John Waterer, Bagshot, Surrey, for *Conifers*.

To Messrs. Cripps, Tunbridge Wells, for *Browallias* and *Begonias*.

##### *Award of Merit.*

To Japanese *Chrysanthemum* 'Lady Esther' (votes, 6 for, 4 against), from Viscountess Hambledon, Greenlands, Henley-on-Thames (gr. Mr. H. Perkins). Very large cream-white flowers with broad substantial petals.

To *Carnation* 'Mrs. Welbore Ellis' (votes, 11 for, 5 against), from Welbore S. Ellis, Esq., Hazlebourne, Dorking (gr. Mr. H. Squelch). A sweet-scented deep crimson flower with serrated petals.

To *Nerine* 'Lady Louisa Longley' (votes, 14 for), from H. J. Elwes, Esq., Colesborne Park, Andoversford. A lovely variety, with delicate salmon-pink flowers striped with rosy-crimson on the lower portion of each segment. The plant exhibited was only three years old from seed.

To Japanese *Chrysanthemum* 'Mrs. R. Darby' (votes, 12 for), from

Mr. C. Griffin, Walton Leigh, Addlestone. A splendid flower with drooping reddish-purple petals with a silvery reverse.

To Inc. Chrysanthemum 'Miss Florence Southam' (votes, 6 for, 4 against), from Mr. A. W. Tanner, Cerne Abbots, Branksome Road, Bournemouth. The shape of flower reminds one of 'C. H. Curtis': the colour is light yellow shaded and striped with rosy-mauve.

To Japanese Chrysanthemum 'C. J. Salter' (votes, unanimous), from



FIG. 195.—CARNATION 'MRS. T. W. LAWSON.' (*Gardeners' Magazine*.)

Messrs. Wells, Earlswood, Redhill. Large deep flowers with rather narrow pale-yellow petals.

To Japanese Chrysanthemum 'Matthew Smith' (votes, 12 for, 1 against), from Messrs. Wells. Beautifully formed flowers with stout petals, reddish-brown on a yellow ground with a yellow reverse.

To Japanese Chrysanthemum 'Madame Von Andre' (sport from 'Mutual Friend') (votes, 10 for, 1 against), from Messrs. Wells and Mr.

W. J. Godfrey, Exmouth. Lovely canary-yellow flowers with broad petals of good form and substance.

To Japanese Chrysanthemum 'W. R. Church' (votes, unanimous), from Messrs. Wells. A grand flower of substantial build, deep brownish-crimson with a golden reverse.

To Japanese Incurved Chrysanthemum 'Khaki' (votes, 9 for, 2



FIG. 196. - CHRYSANTHEMUM INDICUM, SHOWING HABIT. (*The Garden*.)

against), from Messrs. Wells. Lovely deep chestnut-brown (almost crimson) flowers with broad petals with a yellow reverse.

To Decorative Chrysanthemum 'Glorious' (votes, 8 for, 2 against), from Messrs. Wells. Deep crimson flowers with drooping petals with a golden reverse.

To Japanese Chrysanthemum 'Lord Ludlow' (votes, unanimous), from Messrs. Wells. Large flowers with long drooping golden-yellow petals margined with crimson with a paler reverse.

To Japanese Chrysanthemum 'Loveliness' (votes, 12 for), from Mr. W. J. Godfrey, Exmouth. Beautiful flowers with broad incurving soft yellow petals.

To Japanese Chrysanthemum 'Wallace F. Vonden' (votes, 9 for, 4



FIG. 197.—CHRYSANTHEMUM INDICUM. (*Gardeners' Chronicle*.)

against), from Mr. Godfrey. Large flat flowers with brownish-red petals with a paler reverse.

To Tea Rose 'Liberty' (votes, unanimous), from Messrs. Paul & Son, Cheshunt. A winter flowering variety with medium-sized sweet-scented crimson flowers. The plant is of good habit.

To Tree Carnation 'America' (votes, 8 for, 4 against), from Messrs. Paul & Son, Cheshunt. Very fragrant bright salmon-rose flowers of good form and substance.

To Carnation 'Mrs. T. W. Lawson' (votes, 12 for, 1 against), from Messrs. Low, Enfield. Flowers of fairly good form with crimped edges, deep rose-pink and slightly scented. The plant is of sturdy habit (fig. 195). This is the plant which is said to have been sold to an American gentleman named Lawson for £2,000. It is sweet-scented



FIG. 198. *CHRYSANTHEMUM INDICUM*. (*Gardeners' Magazine*.)

and of a pleasing deep pink, but its shape and form are not at all in accordance with the ideas of English Carnation specialists.

To Decorative Chrysanthemum 'Lizzie Adcock' (votes, 12 for), from Mr. R. Holmes, Norwich. A lovely yellow sport from 'Source d'Or.'

### Other Exhibits.

H. J. Elwes, Esq., Colesborne, Andoversford, sent seedling Nerines. From the Director, Royal Gardens, Kew, came a plant of Chrysan-

*themum indicum*, L., a progenitor of the garden *Chrysanthemum*. The plant exhibited (fig. 196) (about 24 inches high) was raised from seed collected in Yangtze by Mr. Grant Birch in 1899. The flower heads (figs. 197 and 198) are about half an inch across, and rich yellow. See *Jour. of R.H.S.*, Vol. xii. p. 111.

Mr. James Douglas, V.M.H., Edenside, Great Bookham, sent Tree Carnation 'Princess Alice of Monaco.'

Richardson Evans, Esq., Camp View, Wimbledon, sent hardy flowers.

Mr. J. Forbes, Hawick, sent Begonia 'Caledonia.'

Messrs. Barr, Covent Garden, sent hardy flowers.

Messrs. Wills & Segar, South Kensington, sent a very fine plant of *Stevensonia grandifolia*.

*Chrysanthemums* were exhibited by---

1. The Rev. Marquis of Normanby, Mulgrave Castle, Whitby (gr. Mr. J. Corbett).

2. Mr. G. Carpenter, West Hall, Byfleet.

3. Mr. C. Crooks, Hadsor, Droitwich.

4. Mr. C. Griffin, Walton Leigh, Addlestone.

5. Mr. E. Chopping, Periwinkle Mill, Milton, Kent.

6. Messrs. Robins, Guernsey.

7. Mr. M. Silsbury, Shanklin, I.W.

8. Mr. W. J. Godfrey, Exmouth.

9. Mr. W. Seward, Hanwell.

10. Messrs. Cannell, Swanley.

11. Mr. F. C. Fowle, Teignmouth.

12. Messrs. Wells, Earlswood, Redhill.

#### FLORAL COMMITTEE, NOVEMBER 20, 1900.

W. MARSHALL, Esq., in the Chair, and fourteen members present.

#### Awards Recommended :—

*Silver-gilt Flora Medal.*

To J. P. Morgan, Esq., Dover House, Roehampton (gr. Mr. J. F. McLeod), for Begonias, Liliums, and foliage plants.

*Silver-gilt Banksian Medal.*

To Messrs. Jas. Veitch, Chelsea, for a group of winter-flowering Begonia 'Ensign.'

To Messrs. Wells, Earlswood, Redhill, for Chrysanthemums.

*Silver Flora Medal.*

To Messrs. Cannell, Swanley, for group of Begonia 'Gloire de Lorraine.'

*Bronze Banksian Medal.*

To Mr. J. H. Witty, Nunhead Cemetery, for Chrysanthemums.

*First-class Certificate.*

To *Tacsonia militaris* (votes, unanimous), from Messrs. Sander, St. Albans. A supposed natural hybrid from South Africa, between



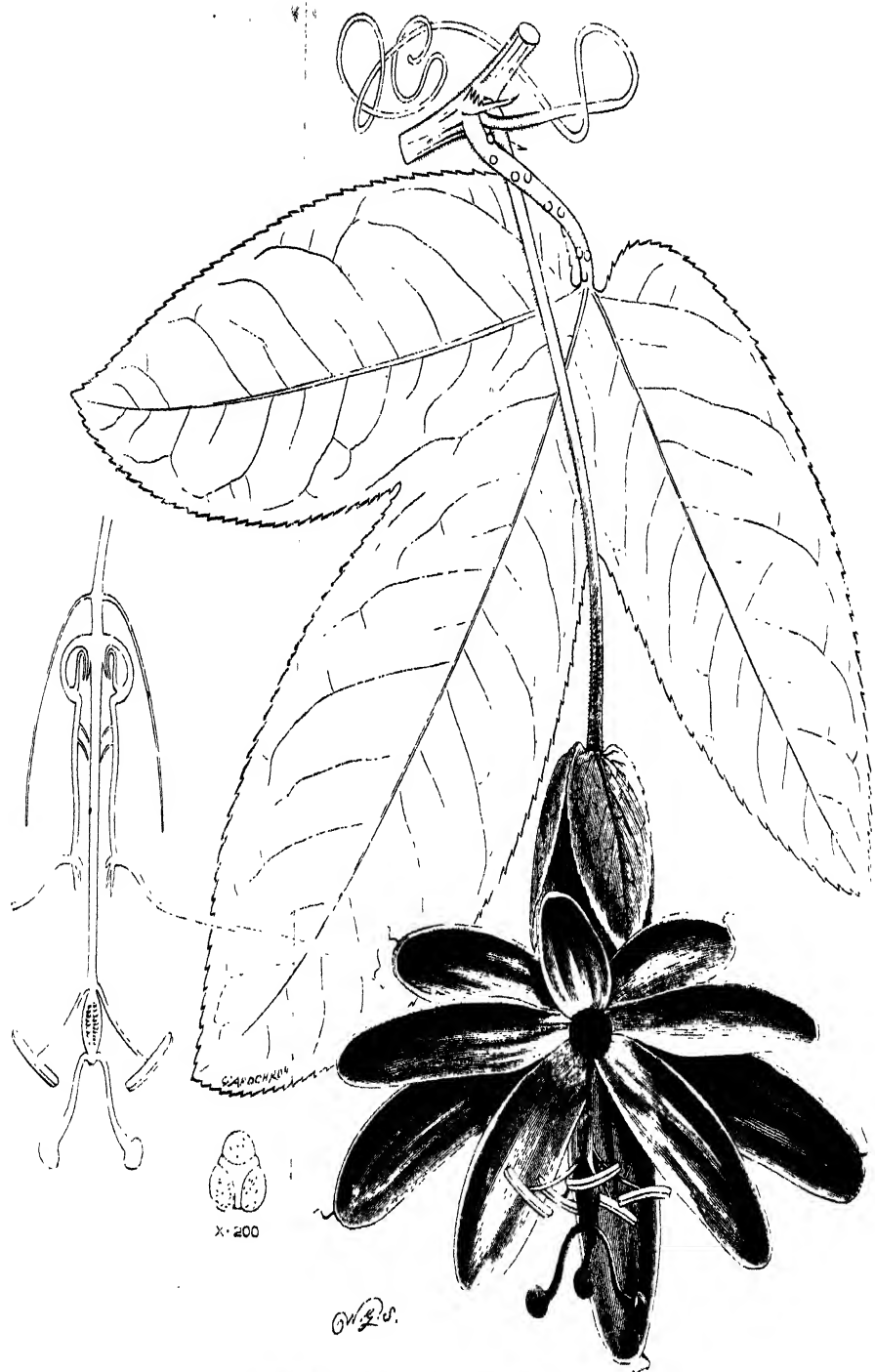


FIG. 199.--*TACSONIA MILITARIS* x. (*Gardeners' Chronicle*.)

(To face page cclx.)



*T. Van Volxemi* and *T. insignis*. The flowers are large, deep crimson, flushed with purple. It is a vigorous-growing climber, and flowers continuously throughout the winter months in a warm greenhouse. (Figs. 199 and 200.)

*Award of Merit.*

To Japanese *Chrysanthemum* 'Mrs. J. Bryant' (votes, 9 for), from Viscountess Hambledon, Greenlands, Henley-on-Thames (gr. Mr. H.



FIG. 200.—*TACSONIA MILITARIS*. (*Journal of Horticulture*.)

Perkins). A splendid flower, with rather narrow rosy-purple petals with a silvery reverse.

To Japanese *Chrysanthemum* 'Miss Jessie Cottee' (votes, 8 for, 5 against), from Frank Lloyd, Esq., Coombe House, Croydon (gr. Mr. M. E. Mills). This is a large deep-yellow sport from 'Etoile de Lyon.'

To Japanese *Chrysanthemum* 'Major Plumbe' (votes, 6 for, 5 against), from Messrs. W. & R. Owen, Maidenhead. A massive flower with deep rich yellow petals.

**Other Exhibits.**

A. de Rothschild, Esq., Halton, Tring (gr. Mr. R. C. Sanders), sent Tree Carnations.

Mrs. Disney Leith, Northcourt, Shanklin (gr. Mr. T. Butler), sent a large bunch of 'Princess of Wales' Violet.

Messrs. Elliot, Hurstpierpoint, sent seedling Carnations.

Mr. Wakefield, Hindon Street, S.W., sent a patent flower-holder called 'Floral Aid.'

Chrysanthemums were exhibited by—

1. Lady Byron, Thrumpton Hall, Derby (gr. Mr. H. Weeks).
2. Viscountess Hambledon, Greenlands, Henley-on-Thames (gr. Mr. H. Perkins).
3. The Rev. the Marquis of Normanby, Mulgrave Castle, Whitby (gr. Mr. J. Corbett).
4. Mr. T. Bullpindore, Edgware, N.
5. Mr. G. Carpenter, West Hall, Byfleet.
6. Mr. A. Tanner, Cerne Abbots, Branksome Park, Bournemouth.
7. Mr. Attenborough, Catesby House, Daventry.
8. Mr. W. J. Godfrey, Exmouth.

#### FLORAL COMMITTEE, DECEMBER 4, 1900.

W. MARSHALL, Esq., in the Chair, and fifteen members present.

#### Awards Recommended :—

##### *Silver Flora Medal.*

To Messrs. Jas. Veitch, Chelsea, for winter-flowering Begonias.

##### *Bronze Flora Medal.*

To Messrs. Wells, Earlswood, Redhill, for Chrysanthemums, amongst which was a very beautiful single flower called 'Earlswood Beauty.' (Fig. 201.)

##### *Bronze Banksian Medal.*

To Messrs. Boyes, Aylestone Park, Leicester, for Carnations.

##### *Award of Merit.*

To Single Chrysanthemum 'Golden Gem' ('Jane' × 'Charming'), (votes, 10 for, 5 against), from G. W. Bird, Esq., Manor House, West Wickham, Kent (gr. Mr. H. Ridden). A beautiful variety, 3 feet high, with a double row of long drooping canary-yellow petals.

##### *Cultural Commendation.*

To Mr. W. Camm, gardener to Her Grace the Duchess of Cleveland, Battle Abbey, Battle, for *Luculia gratissima*.

To Messrs. Jas. Veitch, Chelsea, for *Luculia gratissima*.

#### Other Exhibits.

F. Reckitt, Esq., J.P., Caenwood Towers, Highgate (gr. Mr. F. Burt), sent Chrysanthemums.

Mr. J. A. Mason, 85 Southgate, Sleaford, sent branches and leaves of *Aucubas*.

From Messrs. Low, Enfield, came a small group of *Croton* 'Mrs. Thomas Young,' a new variety with broad highly coloured leaves.

Mr. R. Holmes, Norwich, sent a new white decorative Chrysanthemum named 'Tuckswood White.'





FIG. 201.—CHRYSANTHEMUM 'EARLSWOOD BEAUTY.' (*The Garden.*)

(To face page cxx.)



Messrs. Fidler, Reading, sent *Chrysanthemum* 'Fidler's Favourite,' a sport from 'Western King.'

Mr. Warpur, Isleworth, sent *Impatiens grandiflora*.

Messrs. Ker, Liverpool, sent a plant of *Cyclamen persicum grandiflorum* fl. pl., bearing about a dozen large perfectly double flowers. The *Cyclamen* is not a flower whose beauty seems likely to be increased by doubling.

Messrs. Young, Cheshunt, sent a collection of Pansies.

#### FLORAL COMMITTEE, DECEMBER 18, 1900.

W. MARSHALL, Esq., in the Chair, and fifteen members present.

#### Awards Recommended: --

##### *Silver Flora Medal.*

To Lord Aldenham, Aldenham House, Elstree, Herts (gr. Mr. E. Beckett), for Decorative *Chrysanthemums*.

To Messrs. Jas. Veitch, Chelsea, for winter-flowering Begonias.

To Messrs. Cannell, Swanley, for new Zonal Pelargoniums.

##### *Silver Banksian Medal.*

To the Earl of Ancaster, Normanton Park, Stamford (gr. Mr. J. Butler), for Begonias, Violets and flowering shoots of *Chimonanthus fragrans grandiflorus*.

##### *Bronze Flora Medal.*

To Messrs. Sander, St. Albans, for a group of *Coleus thyrsoides*.

To Messrs. Cuthbert, Southgate, for forced *Narcissi*.

##### *Award of Merit.*

To *Coleus thyrsoides* (votes, unanimous), from Messrs. Sander, St. Albans, Messrs. Jas. Veitch, Chelsea. A new and very pretty free-growing winter-flowering greenhouse plant, introduced from British Central Africa, and flowered for the first time in this country in the Royal Gardens, Kew, about three years ago. Unlike the once popular ornamental-leaved *Coleus* the species now under notice is remarkable for its showy *Salvia*-like small blue flowers, borne in terminal racemes often 8 inches long. The leaves, set on long footstalks, are ovate, toothed, and pale green.

To Decorative *Chrysanthemum* 'Jessica' (votes, 10 for, 1 against), from Lord Aldenham, Aldenham House, Elstree (gr. Mr. E. Beckett). An American variety of compact bushy habit and very floriferous; flowers of excellent shape with narrow white petals.

#### Other Exhibits.

F. W. Moore, Esq., V.M.H., Glasnevin, Dublin, sent an inflorescence of *Dracæna reflexa*.

Mr. M. Jones, Undermount Gardens, Bonchurch, I.W., sent a seedling *Chrysanthemum*.

Messrs. Paul, Cheshunt, sent *Cratægus chlorosarca*, a vigorous hardy thorn, conspicuous in winter for its polished mahogany-like bark and very prominent buds. Also two hardy Hollies and a plant in flower of *Senecio lilacina*.

Messrs. Wells, Earlswood, Redhill, sent *Chrysanthemums*.

## ORCHID COMMITTEE.

ORCHID COMMITTEE, OCTOBER 9, 1900.

HARRY J. VEITCH, Esq., in the Chair, and fifteen members present.

### Awards Recommended.

#### *Award of Merit.*

To *Lælia pumila*, 'Bush Hill' variety (votes, unanimous), from Messrs. Hugh Low. Flowers white, with a pink tinge on the front of the labellum.

#### *Botanical Certificate.*

To *Cirrhopetalum maculosum guttulatum*, from Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White). A good variety of the plant known in gardens as *Bulbophyllum umbellatum*. Flowers cream-white spotted with light purple.

To *Gongora nigrita*, from the Royal Botanic Gardens, Glasnevin, Dublin. Flowers cream-white blotched with purple. Native of Guiana.

### Other Exhibits.

The Right Hon. Joseph Chamberlain, M.P., Highbury, Birmingham (gr. Mr. Smith), staged an interesting group composed of *Cattleya Bowringiana*, and hybrids of it, including the typical *Cattleya* × *Mantini* (*Bowringiana* × *Dowiana aurea*), and *C.* × *Mantini superba*, a very rich crimson-purple form of it; also *Cattleya* × *Bowringiana-velutina*, var. 'Hilda,' with rose-purple flowers, the circular-fronted labellum being formed like *C. velutina*. Also in the group were *Lælio-Cattleya* × 'Duke of York' (*L.-C.* × *elegans* × *C.* × *Brymeriana*), *Cattleya* × 'Minucia' (*Loddigesii* × *Warscewiczii*), and *Dendrobium Phalænopsis*, 'Chamberlain's' variety.

Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), showed *Maxillaria striata*, *Angraecum citratum*, a fine rose-tinted form of *Vanda Sanderiana*, *Epidendrum sceptrum*, and *Masdevallia* × *Ajax superba*.

The Hon. Walter Rothschild, Tring Park (gr. Mr. E. Hill), showed *Cattleya* × *Maroni*, 'Tring Park' variety (*velutina* × *Dowiana aurea*).

W. E. Brymer, Esq., M.P., Dorchester, sent a *Lælio-Cattleya* (*C. Mendeli* × *L.-C.* × *elegans*).

Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), showed flowers of *Cattleya labiata*, 'The Puritan' (white, with pink front to the lip), and *Lælio-Cattleya* × *Ingrami* (*L. Dayana* × *C. Dowiana aurea*).

Henry Little, Esq., Baronshalt, Twickenham (gr. Mr. Howard), showed varieties of *Cattleya Dowiana aurea*.

Captain Holford, Westonbirt (gr. Mr. Chapman), showed good *Dendrobium Phalænopsis*.

Messrs. Jas. Veitch sent *Cattleya* × 'Chloe' (*Bowringiana* × *bicolor*).

## ORCHID COMMITTEE, OCTOBER 23.

HARRY J. VEITCH, Esq., in the Chair, and seventeen members present.

**Awards Recommended:—***Silver Flora Medal.*

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a group of Orchids.

*Silver Banksian Medal.*

To R. I. Measures, Esq., Camberwell (gr. Mr. H. J. Chapman), for a collection of hybrid *Cypripediums*.

To Messrs. Hugh Low, for a group of *Cattleya labiata*, &c.

*First-class Certificate.*

To *Sophro-Lælio-Cattleya* × *Veitchii* var. 'Eros' (*Lælio-Cattleya* × *elegans* *Turneri* × *Sophranitis grandiflora*) (votes, unanimous), from Messrs. Charlesworth, Heaton, Bradford. A fine hybrid with dark scarlet flowers and yellow base to the lip.

*Award of Merit.*

To *Odontoglossum crispum* 'Maud Rochford' (votes, unanimous), from Mr. T. Rochford, Turnford Hall, Broxbourne. Flowers approaching *O.* × *Adrianæ*. White with the inner halves of the segments blotched with chocolate purple.

To *Dendrobium* × *Leeanum atropurpureum* (votes, 10 for, 4 against), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). Flowers dark rose with rose-purple lip.

To *Cypripedium* × 'Vidor' ('Chas. Canham' × *Harrisianum superbum*) (votes, unanimous), from R. I. Measures, Esq. (gr. Mr. H. J. Chapman). Flowers large; upper sepal broad, closely lined with dark purple, margin white with greenish tinge inside; petals and labellum light purple. (Fig. 202.)

*Botanical Certificate.*

To *Dendrobium Moorei*, from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). A small species from Lord Howe's Island. Flowers in short ascending spikes, white.

*Cultural Commendation.*

To Messrs. Jas. Veitch for a grand plant of *Cattleya Bowringiana* 'Veitch's' variety, with three spikes of twenty, twenty-seven, and thirty flowers respectively.

**Other Exhibits.**

Sir Jas. Miller, Bart., Manderston, Duns (gr. Mr. J. Hamilton), showed *Lælio-Cattleya* × (*L. Dayana* × *C. bicolor*) and *Cattleya* × (*Claskelliana* × *maxima*).

Leopold de Rothschild, Esq. (gr. Mr. J. Hudson), showed flowers of a fine *Lælia Perrinii*.

M. Jules Hye-Leysen, Ghent (gr. Mr. Coen), sent a flower of

*Cypripedium* × *Maudiae* (*callosum* Sanderæ × *Lawrenceanum* Heyanum), very closely resembling *C. callosum* Sanderæ.

Henry Little, Esq., Twickenham (gr. Mr. Howard), showed *Lælio-Cattleya* × 'Tiresias' (*C. Bowringiana* × *L.-C.* × *elegans* Turneri); also *Cattleya Bowringiana* and *C. aurea*.

C. H. Feiling, Esq., Southgate (gr. Mr. Stocking), showed a hybrid *Cattleya* said to be a form of *C.* × *massiliensis* (*C. Trianaei* × *C. aurea*).



FIG. 202.—*CYPRIPEDIUM* 'VIDOR.' (*Journal of Horticulture*.)

W. M. Appleton, Esq., Weston-super-Mare, showed hybrid *Cypripediums*.

D. M. Grimsdale, Esq., Uxbridge, sent spikes of *Odontoglossums* and *Cypripediums*.

Messrs. Heath, Cheltenham, showed *Dendrobium formosum giganteum* and *Vanda cærulea*.

Messrs. F. Sander, St. Albans, staged hybrid *Cypripediums* and *Cattleya Loddigesii*.

## ORCHID COMMITTEE, NOVEMBER 6.

HARRY J. VEITCH, Esq., in the Chair, and eighteen members present.

**Awards Recommended:—**

*Silver-gilt Flora Medal.*

To Messrs. Jas. Veitch, Chelsea, for a group of hybrid Cattleyas, Lælio-Cattleyas, &c.

*Silver Flora Medal.*

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White), for a fine group of specimen Orchids, and new species.

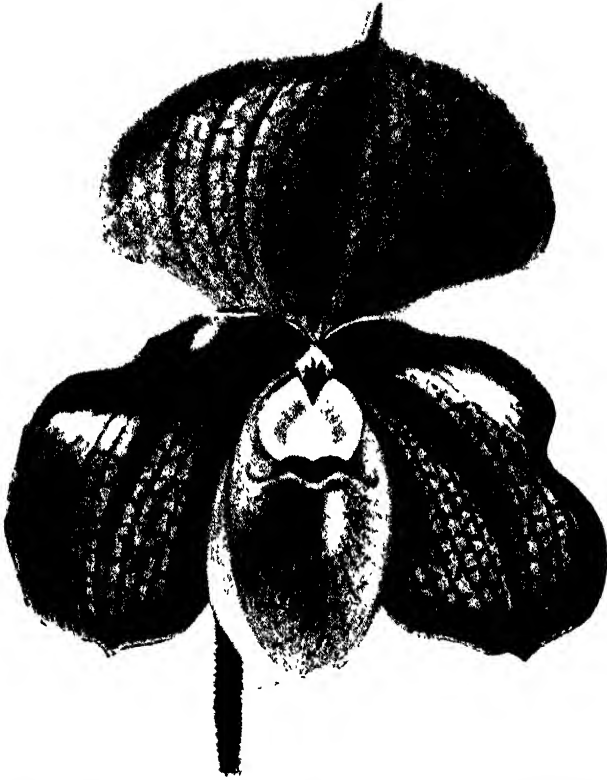


FIG. 203.—CYPRIPEDIUM 'DORA CRAWSHAW.' (*Journal of Horticulture*.)

*Silver Banksian Medal.*

To Messrs. Hugh Low, for a group of Cattleya labiata and other Orchids.

*First-class Certificate.*

To Cypripedium × 'Dora Crawshaw' (bellatulum × Charlesworthii mosaicum) (votes, unanimous), from Messrs. Charlesworth & Co., Heaton, Bradford. Flower fine in substance, the greater part of the surface netted and tinged with purple. (Fig. 203.)

*Award of Merit.*

To Lælia præstans gloriosa (votes, 9 for, 4 against), from Jeremiah

Colman, Esq., Gatton Park (gr. Mr. W. P. Bound). Flowers bright dark-rose colour with claret coloured front to the lip.

To *Masdevallia* × 'Bocking hybrid' (? *cucullata* × *Veitchiana*) (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flower strongly indicating *M. cucullata*. Bright Indian red, with yellow centre.

To *Zygo-Colax* × *Veitchii* *Kromeri* (*Z. crinitum* × *C. jugosus*) (votes,



FIG. 204. — *Zygo-Colax Veitchii Kromeri*. (*The Garden*.)

unanimous), from Mr. Ed. Kromer, Bandon Hill, Croydon. An imported natural hybrid form of the home-raised *Z.-C.* × *Veitchii* flowered in 1887. Sepals and petals green blotched with purple; lip white striped with violet. (Fig. 204.)

*Botanical Certificate.*

To *Masdevallia burfordiensis*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers large, purple, approaching *M. angulata* Lehm.

To *Ansellia humilis*, from Sir Trevor Lawrence, Bart. Habit very dwarf; flowers comparatively large, yellow, blotched with purple.

*Cultural Commendation.*

To Mr. W. H. White, gr. to Sir Trevor Lawrence, Bart., for *Cypripedium* × *onanthum* *superbum*, with many flowers.

To Mr. W. H. White, gr. to Sir Trevor Lawrence, Bart., for *Masdevallia macrura*, with fifteen flowers.

**Other Exhibits.**

Leopold de Rothschild, Esq. (gr. Mr. Jas. Hudson), showed varieties of *Cattleya labiata* and *C. aurea*.

Jeremiah Colman, Esq. (gr. Mr. W. P. Bound), exhibited an interesting collection of Orchids.

Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), showed a fine variety of *Dendrobium spectabile*.

Sir Jas. Miller, Bart. (gr. Mr. J. Hamilton), showed hybrid *Cattleyas*.

Mrs. Briggs-Bury, Bank House, Accrington (gr. Mr. Wilkinson), showed a *Cypripedium* 'Queen Margherita.' A peculiar form of *C. Charlesworthii*, in which much of the usual colouring is suppressed.

Messrs. Charlesworth showed *Cattleya* × 'Pandora' (*Trianaei* × bicolor).

Messrs. F. Sander showed *Lælia* × 'Gemma' (*crispa* × *Dayana*) and other Orchids.

Mr. A. J. Keeling, Bingley, sent *Cœlogyne maculata alba*.

Mr. Jas. Douglas showed *Lælio-Cattleya* × *Gottoiana*, home-raised.

D. M. Grimsdale, Esq., Uxbridge (gr. Mr. Holker), showed a fine *Odontoglossum Londesboroughianum*.

Harry Worthington, Esq., Manchester, showed a fine *Cypripedium* × *Maudiae* (*callosum* *Sanderæ* × *Lawrenceanum* *Hyeaenum*), for which a First-class Certificate was proposed; but as the rules for painting certificated flowers could not be complied with it was withdrawn. (Fig. 205.)

## ORCHID COMMITTEE, NOVEMBER 20.

HARRY J. VEITCH, Esq., in the Chair, and seventeen members present.

**Awards Recommended:—***Silver Flora Medal.*

To J. P. Morgan, Esq., Dover House, Roehampton (gr. Mr. McLeod), for a group of *Cypripedium insigne* extending the whole length of the hall.

To Messrs. Jas. Veitch, Chelsea, for a fine group of hybrid Orchids.

*Silver Banksian Medal.*

To Messrs. Hugh Low, for a group of Orchids.

*Bronze Banksian Medal.*

To F. Knight, Esq., Thundersley House, Thundersley (gr. Mr. F. Marston), for a group of *Cattleya labiata*, *Dendrobium Phalænopsis*, &c.

*First-class Certificate.*

To *Cypripedium* × 'Priam' (× 'Niobe' ♂ insigne *Chantinii* ♀) (votes,



Fig. 205.—*CYPRIPEDIUM MAUMII*. (*Gardeners' Magazine*.)

8 for, 5 against), from Messrs. Jas. Veitch, Chelsea. A fine large flower; upper sepal white with a green base and some purple lines; petals and lip yellowish, tinged with purple. (Fig. 206.)

To *Cattleya* × 'Herbert S. Leon' (*Schroderæ eximia* × *Warscewiczii Sanderiana*) (votes, unanimous), from H. S. Leon, Esq., Bletchley Park (gr. Mr. A. Hislop). Sepals and petals light lilac-rose; lip dark ruby red with slight yellow markings in the tube. (Fig. 207.)

*Award of Merit.*

To *Lælio-Cattleya* × 'Mrs. Birkbeck' (L.-C. × *callistoglossa* × *L. purpurata*) (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). Sepals and petals light rose; tube of lip yellow; front bright dark purple. It resembles L.-C. × 'Henry Greenwood' in some degree.

To *Cypripedium* × *Cobbiae* (× 'Mrs. Chas. Canham' × 'J. Howes') (votes, unanimous), from Walter Cobb, Esq., Dulcote, Tunbridge Wells (gr. Mr. J. Howes). A massive flower, cream-white tinged with rose, the upper sepal having a white margin and green base.



FIG. 206.—*CYPRIPEDIUM* 'PRIAM.' (*Journal of Horticulture*.)

To *Lælio-Cattleya* × *Gottoiana* 'Mrs. Douglas' (*L. tenebrosa* × *C. labiata Warneri*) (votes, 8 for, 0 against), from Mr. Jas. Douglas, Great Bookham. Sepals and petals yellowish-white with slight rose tint; lip rose veined purple.

*Botanical Certificate.*

To *Angræcum distichum*, from Sir Trevor Lawrence, Bart. A small growing species with compressed growths and small white flowers.

To *Coryanthes Mastersiana*, Lehm., from Sir Trevor Lawrence, Bart. Flowers very distinct from other species. Reddish copper colour.

To *Maxillaria Mooreana*, from Sir Trevor Lawrence, Bart. Flowers white, with slight yellow and purple markings. Small.



FIG. 207.—*CATTILIA* 'HERBERT S. LEON.' (*Journal of Horticulture*.)

To *Pleurothallis stenopetala*, from Sir Trevor Lawrence, Bart. Foliage cordate, the narrow green flowers resting on the leaves.

To *Cœlogyne fimbriata*, from Sir Trevor Lawrence, Bart. Flowers whitish, with blackishly fringed lip.

**Other Exhibits.**

Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), sent a hybrid Zygo-Colax, and other Orchids.

Mrs. Briggs-Bury (gr. Mr. Wilkinson), exhibited a spike of *Odontoglossum crispum* with two sets of dissimilar flowers. Also *Cattleya labiata alba*.

C. J. Lucas, Esq. (gr. Mr. Duncan), showed two fine *Dendrobium Phalaenopsis*.

J. F. Ebner, Esq. (gr. Mr. Waite), sent several hybrid *Cypripediums*.

De B. Crawshay, Esq. (gr. Mr. S. Cooke), showed *Oncidium* × *Mantini* *Crawshayanum* (*Forbesii* × *Marshallianum*), with the greater part of the lip and petals yellow.

Mrs. Haywood, Reigate (gr. Mr. C. J. Salter), showed *Cypripedium* × *Bingleyense*.

Mr. Jas. Douglas sent *Lælia* × 'Briseis.'

John T. Gabriel, Esq. (gr. Mr. Ranson), sent *Cattleya Dowiana*.

Messrs. F. Sander sent a fine *Cymbidium Tracyanum*.

W. A. Bilney, Esq. (gr. Mr. Whitlock), sent *Lælio-Cattleya* × *intermedio-flava*.

## ORCHID COMMITTEE, DECEMBER 4, 1900.

HARRY J. VEITCH, Esq., in the Chair, and fourteen members present.

**Awards Recommended:***Silver Flora Medal.*

To Baron Sir H. Schroder, The Dell, Staines (gr. Mr. H. Ballantine), for a group of *Cypripedium* *insigne* *Sanderæ* and other *Cypripediums*.

To Messrs. Jas. Veitch, Chelsea, for a group of *Cypripediums*, hybrid *Cattleyas*, *Lælio-Cattleyas*, &c.

*Silver Banksian Medal.*

To Messrs. Hugh Low, Bush Hill Park, for a group of Orchids.

*First-class Certificate.*

To *Odontoglossum* × *Rolfæ meleagris* (*Pescatorei* × *Harryanum*) (votes, unanimous), from W. Thompson, Esq., Walton Grange, Stone, Stafford (gr. Mr. W. Stevens). A fine flower. White tinged with rose, especially on the reverse side, and blotched with purplish brown. (Figs. 208 and 209.)

*Award of Merit.*

To *Cypripedium* × *Leeanum* 'Prospero' *majus* (*Spicerianum* × *insigne* *Sanderæ*) (votes, 8 for, 1 against), from Messrs. Jas. Veitch. A large light-coloured form.

*Cultural Commendation.*

To Mr. W. Stevens, gr. to W. Thompson, Esq., Walton Grange, for a fine specimen of *Odontoglossum* × *Rolfæ meleagris*.

### Other Exhibits.

Sir Jas. Miller, Bart. (gr. Mr. J. Hamilton), sent two hybrid *Lælio-Cattleyas*.

Thos. Statter, Esq., Whitefield, Manchester (gr. Mr. R. Johnson), showed *Cypripedium* × *Maudiae* (*callosum* *Sanderæ* × *Lawrenceanum* *Hyeantum*), and other Orchids.

M. Otto Froebel, Zurich, showed three hybrids of *Cypripedium* *Chamberlainianum*.

Mrs. Haywood, Woodhatch, Reigate (gr. Mr. C. J. Salter), sent *Cypripedium* × *Bingleyense*.

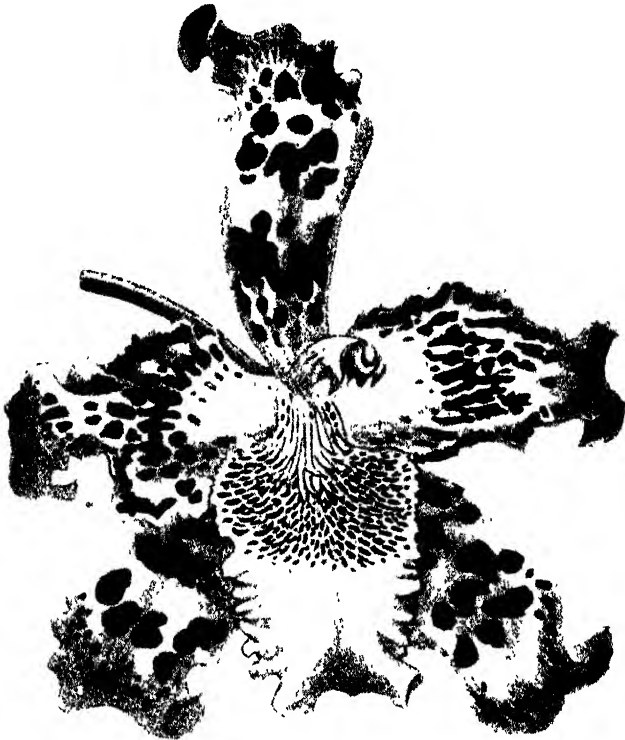


FIG. 208.—*ODONTOGLOSSUM ROLFEÆ MELEAGRIS*. (*Journal of Horticulture*.)

Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), showed *Lælio-Cattleya* × 'Sunray' (*C. superba* × *L. cinnabarina*).

J. Gurney Fowler, Esq. (gr. Mr. J. Davis), sent *Cypripedium* × *Harrisianum* *albens*, with pale-green flowers.

F. Crisp, Esq., Henley-on-Thames (gr. Mr. P. Knowles), showed a good variety of *Vanda* *Sanderiana*.

Mrs. Langton, Reigate (gr. Mr. J. Pearce), showed *Cattleya aurea* 'Hillfield' variety.

G. W. Bird, Esq., West Wickham (gr. Mr. Redden), showed *Odontoglossum* × *Andersonianum*.

M. Warpur showed *Cynorchis purpurascens*.

## ORCHID COMMITTEE, DECEMBER 18.

HARRY J. VEITCH, Esq., in the Chair, and thirteen members present.

**Awards Recommended :—***Silver Flora Medal.*

To Messrs. Jas. Veitch, Chelsea, for a group of hybrid Orchids.

To G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Morris), for a collection of Cypripediums.

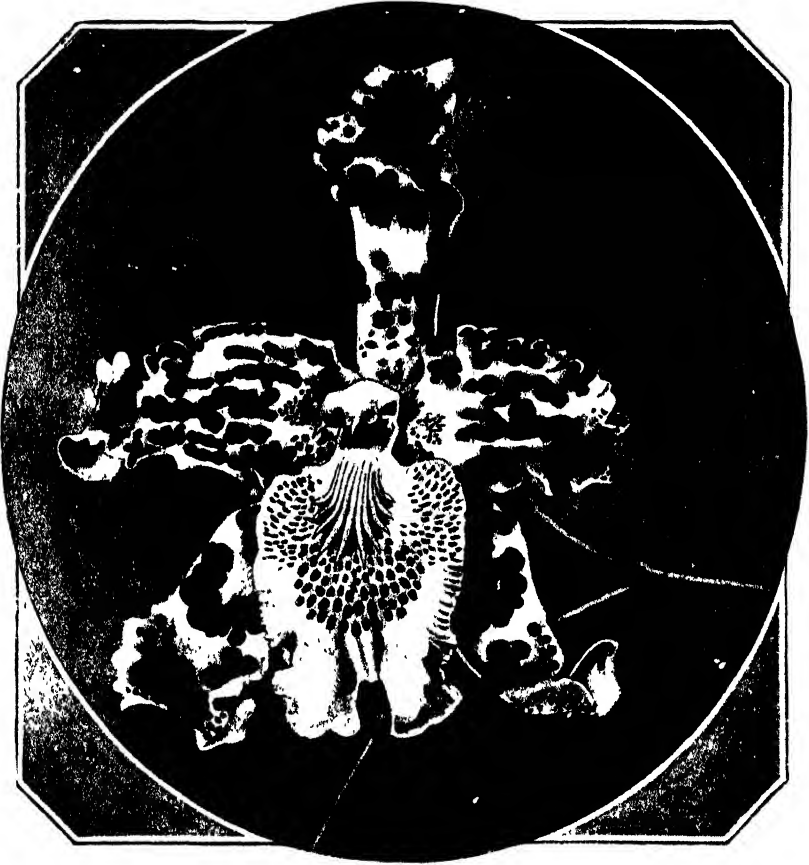


FIG. 209.—*ODONTOGLOSSUM ROLFE* VAR. *MELEAGRIS*. (*Gardeners' Chronicle*.)

*First-class Certificate.*

To *Lælia* × 'Mrs. Gratrix' *grandis* (*Digbyana* × *cinnabarina*) (votes, unanimous), from Messrs. Jas. Veitch. Flowers larger than the original; pale yellow.

To *Cattleya Dowiana* 'Rosita' (votes, unanimous), from M. Chas. Maron, Brunoy, France. Flowers somewhat resembling *C.* × *Hardyana*. Petals blotched rose-purple. Lip crimson with yellow lines. (Figs. 210 and 211.)

*Award of Merit.*

To *Lælio-Cattleya* × 'Cassiope' major (*L.-C.* × *exoniensis* × *L. pumila*), (votes, 4 for), from Messrs. Jas. Veitch. Flowers pale rose with dark purplish-crimson front to the lip.

To *Lælio-Cattleya* × *Lucasiana* (*C. labiata* × *L. tenebrosa*) (votes, unanimous), from J. Hubert Grogan, Esq., Worthing. Resembling



FIG. 210. *CATTELEYA DOWIANA ROSITA*.<sup>•</sup> (*Journal of Horticulture*.)

*L.-C.* × *Gottoiana*. Flowers purplish rose with claret-purple markings on the lip.

*Botanical Certificate.*

To *Neobenthamia gracilis*, from F. W. Moore, Esq., Royal Botanic Gardens, Glasnevin, Dublin. Flowers in terminal clusters; lip spotted yellow.

**Other Exhibits.**

- Norman C. Cookson, Esq., showed *Cypripedium insigne* Sanderae  
 • 'Oakwood' variety, home-raised.



FIG. 211.—*CATTELEYA DOWIANA ROSITA*. (*Gardeners' Magazine*.)

R. I. Measures, Esq., showed *Cypripedium* × 'Zeus' (callosum × ciliolare) and *C.* × Chas. Rickman, 'Ladymead' variety.

F. W. Moore, Esq., Glasnevin, sent *Maxillaria longisepala*, *M. picta*, *M. punctata*, and *Houlletia odoratissima*.

Henry Little, Esq., Baronshalt, Twickenham (gr. Mr. Howard), showed *Cattleya Percivaliana* 'Little's' variety.

Lieut.-Col. Shipway, Grove House, Chiswick (gr. Mr. Walters), showed two *Lælia autumnalis alba*.

C. H. Feiling, Esq., Southgate (gr. Mr. Stocking), sent *Cypripedium Boxallii atratum*.

W. A. Bilney, Esq., Weybridge (gr. Mr. Whitlock), showed *Cymbidium Tracyanum* 'Fir Grange' variety.

Messrs. F. Sander showed a selection of varieties of *Epidendrum* × *Endresio-Wallisii*.

C. Stewart Harris, Esq. (gr. Mr. Davis), showed *Cypripedium* × 'Hilda Davis' (*insigne Charitinii* × *C. × Leea-num*).



## NOTICES TO FELLOWS.

*MARCH 1901.*

### FRUIT.

Figs, Peaches, and Nectarines will be ready from about the second week in June and onwards. Fellows can purchase the same by writing to *The Superintendent, R.H.S. Gardens, Chiswick, W.* Prices will vary according to the size of the fruits. If sent by post carriage will be charged extra.

### LETTERS.

*All letters on all subjects (except the above) should be addressed—The Secretary, R.H.S. Office, 117 Victoria Street, Westminster, S.W.*

### TELEGRAMS.

**“HORTENSIA, LONDON,”** is sufficient address for *telegrams*.

### FELLOWS' PRIVILEGES OF CHEMICAL ANALYSIS, &c.

Full instructions are contained in “Arrangements 1901,” pages 25-32, and an epitome thereof will be found on page clxv.

### PLANTS CERTIFICATED.

A list of all the Plants, Fruits, Flowers, Vegetables, &c., certificated by the Society up to January 1, 1900, has been published, price 5s. The section devoted to Orchids, interleaved with lined foolscap and bound in cloth, can be obtained for Fellows by special order, price 5s.

The compilation of this volume has entailed an enormous amount of labour and research, and it is hoped that many Fellows will purchase a copy, not merely for the value of the information it contains, which, however is very great, but also in order to take a small share in the very considerable expense necessarily incurred in the publication of such a work. It can be obtained by Postal Order from the Society's Office, 117 Victoria Street, Westminster.

## NEW FELLOWS.

The Centenary of the Society in March 1904 is fast approaching, and the Secretary is most anxious to double the number of Fellows before that eventful date. Will every Fellow assist him by sending in the name of at least one new Fellow during the present year?

## LECTURES, &c.

Any Fellows willing to Lecture or to communicate Papers on interesting subjects are requested to communicate with the Secretary.

## DRACÆNAS.

The Superintendent, R.H.S. Gardens, Chiswick, W., would be greatly obliged for any old plants of *Dracænas*, however old and long. Please shake out all the earth from the roots and send direct to Chiswick.

## SUBSCRIPTIONS.

All Subscriptions fall due on January 1 of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

## DISTRIBUTION OF PLANTS, &c.

A list of plants to choose from was sent to every Fellow on January 31 (as it is every year), enclosed in the "*Report of the Council*" for the last year, and the ballot for order of distribution was made on March 1. All Fellows participate in the yearly distribution in the March *following* their election. No distribution can be made later in the year, though from the large number of Fellows to be served it is often the end of April before the March distribution can be completed.

## MEETINGS AND SHOWS.

1901 (remaining), March 26; April 9, 23 (Auricula Show); May 7; 22, 23, 24 (Temple); June 4, 18; July 2 (Rose Show), 16 (Conference on Lilies at Chiswick), 30; August 13, 27; September 10, 24; October 10, 11, 12 (Crystal Palace); 15, 29; November 12, 26; December 17. 1902, January 14, 28: the tickets of 1901 are available for these two Meetings in 1902. A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Office 117 Victoria Street, S.W., a sufficient number of halfpenny cards *ready addressed* to himself.

## SPECIAL SHOWS IN 1901.

Daffodils, April 9, at Drill Hall ; Auriculas and Primulas, April 23, at Drill Hall ; Roses, July 2, at Drill Hall ; Lilies, July 16 and 17, at Chiswick ; Dahlias, September 24, at Drill Hall.

## TEMPLE SHOW.

May 22, 23, 24. Fellows of the Society are admitted free on showing their tickets. *N.B.*—Each *Personal Pass* is strictly non transferable, and will admit only the Fellow to whom it belongs. Fellows' *Transferable Tickets* are available for themselves or their friends. The general public are admitted by purchased tickets : on Wednesday, May 22, from 12.30 to 7 P.M., 7s. 6d. ; on Thursday, May 23, from 9 A.M. to 7 P.M., 2s. 6d. ; on Friday, May 24, from 9 A.M. to 6 P.M., 1s.

To avoid the inconvenience of crowding, tickets may be obtained beforehand at the Society's Office, 117 Victoria Street, S.W., or at the Treasurer's Office, Inner Temple.

The Society's Offices at Westminster will be closed on the days of the Show, and consequently no letters should be addressed there on the previous day.

On the days of the Show tickets will only be on sale near the entrance to the Gardens (Thames Embankment Gate).

Members of Affiliated Societies and *bona fide* gardeners may obtain 2s. 6d. tickets for 1s., which will admit them to the exhibition on Thursday. These tickets *can only be obtained* on or before May 20 from the Society's Office, 117 Victoria Street, S.W., and a large stamped and directed envelope must be sent with Postal Order in every case. Members of Affiliated Societies must apply *only through the Secretary of their own Society* if they wish to take advantage of this privilege.

## LILY CONFERENCE AND SHOW.

July 16 and 17 at Chiswick. The programme of the Conference, &c., with names of readers of papers, will be ready early in May, and may be had on application. The Meeting is expected to be a particularly interesting one. Exhibits of Lilies and other flowers and fruit are invited.

## GREAT SHOW OF BRITISH-GROWN FRUIT.

At the Crystal Palace, October 10, 11, 12. Fellows are particularly requested to subscribe a small sum towards the Prizes, as £100 must be raised before April. Send to the Secretary. Schedules of the Prizes can be obtained early in May.

## BINDING THE JOURNAL.

There are two separate numbers of Vol. XXV.—Parts 1 and 2 (in one), issued November 1900, and the present Part. The Title-page and Table of Contents, which will be found enclosed in the present issue, should be placed at the commencement of the whole Volume. Then should follow the parts of the JOURNAL proper, which is paged in figures from 1 to 406. After this should come the parts of “Extracts from the Proceedings,” which are paged in letters from i to ccxxxvi, finishing with the Index.

## ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may indirectly be benefited. An Index to the Advertisements will be found on page 38.



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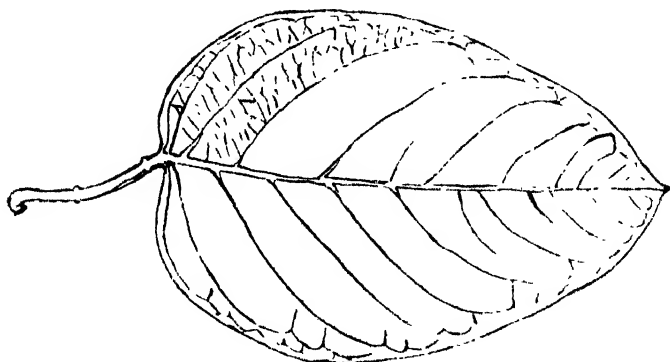
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